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STUDIES ON THE MORPHOLOGY AND ECOLOGY OF THE RICE LEAF-BEETLE, *LEMA ORYZAE* KUWAYAMA, WITH SPECIAL REFERENCE TO THE TAXONOMIC ASPECTS[1)]

BY

Satoru KUWAYAMA

With 4 Plates, 13 Text-figures and 8 Charts

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1) This paper is based on the work done at the Hokkaido Agricultural Experiment Station and is published with the approval of the Director.

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I. INTRODUCTION

In Japan, as is well known, the rice-culture was first begun many centuries ago and it has since developed remarkably year by year, and we can now find rice-fields all over the country from Hokkaido in the north to Taiwan (Formosa) in the south. Unfortunately, however, this crop is not exempt from the attacks of various insect-pests, and up to the present more than one hundred and seventy species have been reported by many research workers as noxious to the rice-culture. Among them the following species are considered to be more serious and decidedly important:

1. Rice locust (*Oxya velox* FABRICIUS).
2. Rice thrips (*Haplothrips oryzae* MATSUMURA).
3. Rice plant-hoppers (*Liburnia furcifera* HORVÁTH, *Liburnia oryzae* MATSUMURA and *Liburnia striatella* FALLÉN).
4. Rice leaf-hoppers (*Nephotettix apicalis cincticeps* UHLER and *Deltocephalus dorsalis* MOTSCHULSKY).
5. Rice bugs (*Podops lurida* BURMEISTER and *Lagynotomus assimulans* DISTANT).
6. Rice caddice-worms (*Setodes argentata* MATSUMURA and *Oecetis nigropunctatus* ULMER).
7. Rice borers or Paddy borers (*Chilo simplex* BUTLER and *Schoenobius incertellus* WALKER).
8. Rice leaf-roller (*Cnaphalocrocis medinalis* GUENÉE).
9. Purplish stem-borer (*Sesamia inferens* WALKER).
10. Rice leaf-caterpillar (*Naranga aenescens* MOORE).
11. Rice leaf-wrapper (*Parnara guttata* BREMER).
12. Rice leaf-beetle (*Lema oryzae* KUWAYAMA).
13. Rice armoured beetle (*Hispa armigera* OLIVIER).
14. Rice root-worm (*Donacia lenzi* SHOENFELDT).
15. Rice curculio (*Echinocnemus bipunctatus* ROELOFS).
16. Rice crane-flies (*Tipula parva* LOEW and *Tipula praepotens* WIEDEMANN).
17. Rice leaf-miner (*Oscinis oryzella* MATSUMURA).
18. Rice ear-maggot (*Chlorops oryzae* MATSUMURA).

Of the foregoing species, rice borers, rice plant-hoppers, rice leaf-hoppers, rice bugs, etc. have been examined in detail by many students, but up to now no thorough research on the rice leaf-beetle has been done, although its injury often surpasses that of all others, as both adults and

larvae devour rice-leaves mercilessly. As the rice leaf-beetle is an old pest and widely distributed over our country, we can enumerate many records of its injuries and general or fragmentary observations, as will be referred to in the next chapter. Several experiments on the controlling measures were conducted by the Imperial Central Agricultural Experiment Station in Tokyo, as well as by the Agricultural Experiment Stations of Fukushima, Gunma, Hiroshima, Hyôgo, Ishikawa, Nagano, Niigata, Shimane, Yamagata, Yamaguchi and many other Prefectures. There are, however, many items needing further researches, especially on the following points, as well as on the experiments on the controlling measures supplementary to those previous works.

1. Identification of the species: The rice leaf-beetle was at first identified as *Lema flavipes* SUFFRIAN, which is undoubtedly a synonym of *L. tristis* HERBST, so the latter name was adopted; but recently another name, *L. melanopa* LINNÉ, has been referred to. However, many ecological characters of our beetle differ very much from the European records of *L. tristis* or *L. melanopa*. Thus a re-examination of the morphological characters and a more precise taxonomic study are quite imperative.

2. Number of generations: The previous records on the number of generations differ from one to three times yearly, not only due to the difference of localities, but also according to the different observers in the same locality. Determination of the number of generations is also a necessary item.

3. Ecological habits: As already stated, there are many obscure passages on the ecology of this beetle. The investigations on this line may throw a light on the consideration of the controlling measures.

4. Surveys on the distribution: The rice leaf-beetle is widely distributed in Japan from Hokkaido to Taiwan and Chosen (Korea), but the injuries done by it are considerably different according to localities. Accurate survey on the distribution may be helpful in determining the original home of this pest.

5. Natural enemies: Up to the present, there are some records on the parasitic Hymenoptera, yet our knowledge in regard to this phase is much inferior to the others. Moreover, there is no record on the predaceans. To control the rice leaf-beetle, the investigation of the natural enemies seems to be the first step.

The serious ravages done by this leaf-beetle in recent times, especially in Hokkaido, have made me carry out somewhat a long and

painstaking investigation. I had this pest under my observation at the Hokkaido Agricultural Experiment Station since 1922, and have tried many experiments along the controlling measures. From my careful examination, I discovered some distinct differences existing between our rice leaf-beetle and *Lema melanopa* of Europe, and *Lema tristis* as well, not only on the morphological characters of the adult, but also on those of the egg and larva. My subsequent study revealed that our species was still undescribed; so I gave it a new name, *Lema oryzae*, in March, 1931. Now, as my studies on the external morphology, taxonomy and some phases of ecology of this pest have nearly done, I proceed to give in the following pages the records of results and discussions.

Before proceeding further, I wish to express my heartiest thanks to Prof. Dr. S. MATSUMURA of the Hokkaido Imperial University, who gave me many helpful suggestions from time to time in the course of this investigation. A grateful acknowledgment is also due to Prof. Dr. T. ESAKI of the Kyushu Imperial University for his kind information and for the loan of several valuable specimens, and to Mr. W. E. H. HODSON of the University of Reading, England, for his kindness in sending me the specimens of *L. melanopa*. To Dr. M. YANO, Assist.-Prof. Dr. T. UCHIDA, Dr. H. KÔNO, Messers. R. TAKAHASHI, J. SONAN and S. MITSUHASHI, I am also indebted in various ways. I must also avail myself of this opportunity to express my hearty thanks to Prof. Dr. S. ITO of the Hokkaido Imperial University, and to Dr. T. ABIKO, Director of the Hokkaido Agricultural Experiment Station, and to the other members in the Experiment Station for their friendly sympathies and assistance, without which it would have been very difficult for me to carry out the work.

II. HISTORICAL SKETCH

It is not certain when our country-men first paid any attention to the economic loss caused by the rice leaf-beetle, but a reference made to this insect appeared as early as 1826, over a century ago, when N. ÔKURA (*72*)[1] issued a remarkable contribution, "Jokôroku", on the controlling measures of the rice-pests. In this paper, he enumerates ten species of "Ina-mushi" or rice-pests. Though the description is very simple, still it is sufficient in enabling us to identify his tenth species "Kogane-mushi", a small shining beetle, with our own rice leaf-beetle.

In 1882, the Industrial Bureau of the Iwate Prefectural Government (*98*)

1) Reference to the bibliography is made by the number in parenthesis.

reported the status of this pest, together with its brief life-history and controlling measures. According to this report, the ravages wrought by the rice leaf-beetle extended all over the rice-fields in Iwate Prefecture. The insect went by the name of "Doroko" or "Katsugi-mushi" among the farmers in that district. N. ÔTSUBO (*77*) of Gifu and Y. SETO (*81*) of Ishikawa published their practical results of controlling this pest, which they called "Doro-mushi", respectively in 1883 and 1884. According to their statements, it is probable that this pest had existed for a long time in those districts.

In 1891, M. ONO (*73*) published a manual of the important insect-pests, and described also the "Doro-oi-mushi". However, according to his description and figure, he seems to have confounded this species with certain other pests. G. OJIMA (*68*) also briefly referred to this pest in his book published in 1892.

In 1896, S. ONUKI (*74*) gave the distribution of the important insect-pests of crops in our country, and stated that the rice leaf-beetle was distributed chiefly in the northern part of Honshu, such as Akita, Yamagata, Iwate, Fukushima, Miyagi, Nagano, Niigata, Ishikawa and Toyama Prefectures, though found also in Tottori, Shimane and Hiroshima Prefectures.

Our knowledge on this pest was greatly extended in 1897. In that year, S. MATSUMURA (*22*) issued a book entitled "Gaichû Kujo Zensho" (Manual of Insect Control), and he identifies the rice leaf-beetle as *Lema flavipes* (SUFF.) among the phytophagous beetles. As far as I am aware of, this is the earliest reference made to the scientific name of this pest. Based on his observations obtained in Nagano Prefecture, C. SASAKI (*78*) published a paper on the life-history. He states that this pest has two generations yearly, and overwinters in the adult-stage, the first appearance of the larva being at the middle of July and the final at the end of September. On the other hand, S. KATÔ (*51*) published a paper on the life-history and controlling measures of this insect in the Ôu district. According to him, there is only one generation per year in that district. The adult appears in rice-nursery from the beginning of May, the eggs deposited being usually hatched from the end of May to the beginning of June. The larva changes to the pupa in the middle and the end of June, and the adult issues in the beginning of July; so the injuries done by it after the transplantation of rice-plant are not severe.

In 1898, S. MATSUMURA (*56*) reported on the status of the principal insect-pests of rice-plant in Hokkaido, enumerating twelve species. According to his investigation the rice leaf-beetle was first discovered at Teine

and Kotoni, near Sapporo, five or six years before that time. Severe injuries were done by this pest also in the previous year at Kameda near Hakodate, and in its vicinity. This beetle produces two or three generations per year. "Nippon Konchûgaku" (Entomology of Japan), an excellent publication by the same author appeared in the same year. It contains also a brief account and figure of this species under the name of "Ine-hamushi" (*Lema flavipes*).

In 1899, two important books on the injurious insects of Japan were furnished by S. MATSUMURA and C. SASAKI. MATSUMURA (*57*) in his "Nippon Gaichû Hen" (Injurious Insects in Japan) recorded this species with text-figures under the name of *Lema flavipes* SUFF. which produces two generations per year in the Sapporo district, and two or three in other infested localities. SAKAKI (*79*) in his "Nippon Nôsakumotsu Gaichû Hen" (Manual of Crop-Pests in Japan) described identical facts in his previous paper (*78*). He used another name *Lema flaviceps* SUFF. and recorded Hokkaido and Nagano, Aomori and Fukushima Prefectures as badly infested districts.

In 1901, Toraji TANAKA (*92*) of the Niigata Agricultural Experiment Station described in detail the rice leaf-beetle, and also its life-history and habits, including the description of a parasitic Chalcid. According to his report this leaf-beetle produces two generations yearly in that Prefecture. The Niigata Agricultural Experiment Station (*122*) added in 1902 one more parasite, which comes under the family of the Ichneumonidae, with a description of adult and fine coloured plate.

In the "Jitsuyô Konchûgaku" (Economic Entomology) published in 1903, S. ONUKI (*75*) followed SASAKI's opinion; and he (*76*) also published in the following year the results of controlling experiments carried out in Yamagata Prefecture. In 1905, I. KUWANA (*52*) regarded this species in his publication. The same year the Yamagata Agricultural Experiment Station (*103*) reported the investigations on three species of the insect-pests of rice-plant, the rice leaf-beetle being one of them. *Lema flaviceps* was adopted as its scientific name, and the number of generations was considered to be twice per year. In 1906, C. ISHIKAWA (*49*) briefly noted this species under the name of *Lema flavipes*.

In his well known "Thousand Insects of Japan", Vol. IV, published in 1907, S. MATSUMURA (*24*) illustrated and described two species of the genus *Lema*, one of which being *Lema flavipes*. The Iwate Agricultural Experiment Station (*99*) stated in 1909 that this pest produces two generations yearly, but the Akita Agricultural Experiment Station (*94*, *95*)

reported in 1908 and 1909 the results of the investigations stating that it produces only one generation per year. H. OKAMOTO *(70)* also stated in 1909 that this beetle in Hokkaido has only one generation per year.

In 1910, T. HORI and T. SHIRAKI *(48)* published a general survey on the injurious insects in Taiwan, and in that paper they described the rice leaf-beetle as *Lema flavipes*, which has three generations yearly in that island. In the following year T. SHIRAKI *(83)* also enumerated this species in his "Catalogue Insectorum noxiorum Formosarum".

In 1913, H. OKAMOTO *(71)* published a handbook of the insect-pests in Hokkaido, and dealt with this species which causes severe injuries in the country-sides of Hakodate. He recommended the use of boat-shaped net for the controlling. U. NAWA *(65)* also mentioned this species, referring to *Lema flavipes* as one of the Chrysomelidae in economic importance. In the same year, an excellent paper on this pest was published by J. OKADA *(69)* of the Yamaguchi Agricultural Experiment Station. According to his report, the rice leaf-beetle has occurred in the mountain-districts of that Prefecture for about thirty years, having probably emigrated from Shimane Prefecture, and this has only one generation per year. In this paper, one egg-parasite and three larval parasites were recorded with their characters and percentages of parasitism, illustrated with a coloured plate. In T. SHIRAKI's paper *(84)* published during that year, and also in U. NAWA's paper *(66)* published in 1914, this pest was enumerated, but no new fact was added.

In 1915, T. MURATA *(62)* published a book on the controlling measures of cereal pests. He accepted the name *Lema flavipes* and asserted that it has only one generation yearly. In the same year, S. MATSUMURA *(26)* completed the second volume of his Manual of the Injurious Insects in Japan, and he adopted *Lema tristis* HERBST to the rice leaf-beetle, as *Lema flavipes* is the synonym of the former. He proposed "Ine-doro-hamushi" as its common name in Japan. The number of generations given in his new book accords with his previous paper. Accordingly, the identical name, *Lema tristis*, given to the rice leaf-beetle was used by the same author *(27)* in his Systematic Entomology, Vol. II.

S. TAKAHASHI *(88)*, in 1916, stated under the name of *Lema flavipes* that it produces only one generation yearly, and I. KUWANA *(53)*, in 1918, maintained the same opinion with regard to the number of generation, while he used the name *Lema flaviceps*. C. SASAKI *(80)* adopted *Lema tristis* to this species in his book published in 1919, but he recognized two generations per year.

In 1922, the Hokkaido Agricultural Experiment Station (*96*) gave a warning on this pest, telling people how rapidly the infested area had spread in recent times. The Shimane Agricultural Experiment Station (*101*, *102*) investigated the life-history, habits, distribution, etc. of the beetle in that Prefecture; and the results of the investigations were published in the annual reports of that Experiment Station for the years 1921 and 1922.

S. TAKAHASHI (*89*), in his Agricultural Entomology published in 1923, described a brief account of this species under the name of *L. flavipes*, and holds an opinion that it has one generation per year. In 1924, Tomitaro TANAKA (*91*) recognized this pest as one of the most serious pests to the rice-culture in Tochigi Prefecture. In 1925, the Kankyô-Hokudo Agricultural Experimental Farm in Chosen (*100*) recorded the severe injury of this pest in the Kainei and Shôjô districts in the northern part of Chosen.

Many important papers appeared in 1926. In January, J. MURATA and T. IKEDA (*59*) published a paper on the rice leaf-beetle in Nagano Prefecture. They stated that this pest has been recognized over eighty years ago in that Prefecture, and there is only one generation per year, hibernation occurring in the adult-stage. They adopted the name *Lema tristis* HERBST. In February, C. SHIMOYAMA (*82*) stated a general account of this beetle in Shimane Prefecture. In August, J. SONAN (*85*) published a paper on the "Taiwan-ichimonji-hamushi" (*Morphosphaera* sp.), a pest of *Ficus retusa*, and he added his notes on the rice leaf-beetle in Taiwan. According to his statement, the rice leaf-beetle has recently been identified by a member of the British Museum on the request of T. SHIRAKI as *Lema melanopa* LINNÉ, which is a destructive pest to oats, barley and wheat in the central Europe, and is not as *Lema tristis* or *L. flavipes*. He also reported that this species produces only one generation in that island, the adult appearing from the beginning of February, the mating and oviposition continuing from that time on to the middle of May, the new adult issuing in about 28 days after the egg-laying, and hibernating under the ground of pasture land in mountain-districts during the end of May and the end of June without mating or deposition of eggs. The previous records that there are three generations in that island were not accepted by him, as fairly attested by the careful investigation done by S. INAMURA. In November of the same year, independent of the SONAN's paper, Hiroharu YUASA (*42*) announced the scientific name of the rice leaf-beetle. After a thorough discussion he insisted on adopting *Lema melanopa* LINNÉ to the species under consideration. In March of the following year the same author (*42*) briefly noted the coincidence of his opinion

with that of SONAN. However, K. YOKOYAMA (*40*) adopted *Lema flavipes* in the "Nippon Dôbutsu Zukan", or the Iconography of the Animals in Japan, published in 1927. In the same year, the Hokkaido Agricultural Experiment Station (*97*) noticed once more the rice leaf-beetle in Hokkaido. In the revised edition of his book published in 1915, referred to in the foregoing lines, T. MURATA (*63*) adopted *Lema melanopa* to this species.

In 1928, J. MURATA and I. SEKIYA (*60*) adopted *Lema melanopa* in their report of the experiments on the controlling measures of this pest. S. TAKAHASHI (*90*) followed them in the same year in adopting *Lema melanopa*. R. NODZU (*67*) published also a paper on the rice leaf-beetle in Shimane Prefecture, with a special reference to the controlling measures. He wrote that this pest had been known from 1887 in a part of the Prefecture and had increased year by year, doing a terrible damage upon crops. He stated also that the generation of this pest occurs only once a year. On the contrary, T. MACHIDA and T. AOYAMA (*55*) recorded this pest from Chosen, recognizing two generations a year under the name *Lema flaviceps*. In November of 1928, I (*54*) published a paper on the principal insect-pests of the rice-plant in Hokkaido, and discussed in detail this pest on its distribution, morphology, ecology, injuries and controlling measures. I adopted the name *Lema melanopus* LINNÉ, following YUASA's opinion.

The Board of Agriculture in the Department of Agriculture and Forestry (*93*) published the second report of surveys on the distribution of the insect-pests and diseases of crops in 1929. According to this report, this pest is distributed widely in Hokkaido, in twenty-two prefectures of Honshu as well as in one prefecture of Kyushu. Adoptation of *Lema flaviceps* in this report is noticeable. In February, J. SONAN (*86*) discussed the relation between the outbreaks of insect-pests and geography in Taiwan. He treated the rice leaf-beetle under the name *Lema* (*Crioceris*) *melanopa* as a local pest, and stated that this pest is distributed only in the submontane districts of the north eastern part of the island, and also in Kashôtô-Island. According to him, this pest in Taiwan has a tendency to distribute from the north to the south, and has only one generation a year. In March, J. MURATA and others (*61*) published a report in regard to their studies on the rice leaf-beetle, but I don't see any improvements on its contents, which are almost identical with the preceding papers published in 1926 and 1928. In May of that year, W. E. H. HODSON (*47*) treated the bionomics of ***Lema melanopa*** **in Great Britain, and** he has the following to say **on** the rice leaf-beetle: "A strange record comes from Japan, by **Murata**

and Ikeda[10]. *L. melanopa* is reported as damaging rice. The adults feed at the end of May and oviposit in June, after mating. More than a hundred eggs are laid in several masses, and the larvae pupate on the leaves 2-3 weeks after hatching. As all European records indicate that the eggs are laid singly, and that the larvae invariably pupate in the soil, it would appear that the beetle has been wrongly identified. The species referred to may be *Lema tristis*, Herbst."

Two papers by me and Hiro. YUASA appeared at the same time in October, 1929. I (*17*) published a short paper on the scientific name of the rice leaf-beetle in Vol. III, No. 3 of the Kontyû. I expressed my hesitation in identifying it with *Lema melanopa* on account of the differences of food-plants, egg-laying habits, pupating habits, as well as on account of recent radical spreading in Hokkaido. Though I reserved to determine taxonomically, yet I proposed to use *Lema oryzae* when it becomes clear to be an undescribed species. On the contrary, Hiro. YUASA (*43*) published a paper on the difference between our rice leaf-beetle and *Lema melanopa* in the same number of the magazine. After discussing the ecological characters of both species, he stated that the difference of pupating habit can not be adopted as a specific feature, while the difference of food-plants is most important; and that until finer morphological differences between both species be found, he would have to look upon our leaf-beetle provisionally as *Lema melanopa*, or merely to consider it as only a physiological race different from European one. In the same year, S. NAKAYAMA (*64*) discussed also the rice leaf-beetle in his annotated list of more important injurious insects in Chosen. He adopted the old name, *Lema flaviceps*. According to him, this species has one generation a year, and abundantly occurs in the mountain-districts.

In March, 1930, S. MATSUMURA (*28*) published a text-book of Agricultural Entomology, and described the rice leaf-beetle, adopting the name *Lema melanopa*. However, the description on the life-history is the same as those in his previous papers published in 1899 and 1915. In the same month, J. SONAN (*87*) refers to this pest in his Lectures on Crop-Pests, published by the Bureau of Plant Industry, Government of Formosa. The description conforms with his previous papers in 1926 and 1929. Last March I (*18*) gave a brief description of the beetle under the name of *Lema oryzae*, which, I think, should take the cognominal priority to all other names.

The works above mentioned are some of the important publications on the rice leaf-beetle. There is, however, room enough to the students of

this important subject in their faithful and painstaking research.

III. MATERIAL AND METHODS

The majority of the rice leaf-beetle of the present study was collected at Kotoni, a suburb of Sapporo, but some were collected in various localities in Hokkaido, such as Nagayama, Kagura and Itchan in the Province of Ishikari, and Ôno in the Province of Oshima. Besides these Hokkaido products, pretty many specimens were placed at my disposal as listed below:

Sender	Locality collected	Date of collection	Collector	Kind of Specimen [1]			
				Adult	Egg	Larva	Pupa & Cocoon
Aomori Agr. Exp. Sta.	Kuroishi-machi, Prov. Mutsu	9-VI-1930	S. ASAHARA	D.A	—	A	—
Akita Agr. Exp. Sta.	Junisho-machi, Prov. Ugo	21-V-1930	R. TAKEDA	D.A	A	—	—
Yamagata Agr. Exp. Sta.	Yamagata, Prov. Uzen	9-VI-1930	D. TOYOTA	D.A	A	A	—
Niigata Agr. Exp. Sta.	Suyoshi-mura, Prov. Echigo	13-VI-1930	N. TAKAHASHI	D.A	—	A	—
Toyama Agr. Exp. Sta.	Horikawa-mura, Prov. Etchu	12-VI-1930 4-VII-1930	S. IWAYAMA	D.A	A	A	A
Ishikawa Agr. Exp. Sta.	Minma-mura, Prov. Kaga	20-VI-1930	K. KATSUMATA	D.A	A	A	A
Nagano Agr. Exp. Sta.	Kawagishi-mura, Prov. Shinano	—	T. ASANUMA	A	—	A	—
Yamanashi Agr. Exp. Sta.	Hotaru-mura, Prov. Kai	19-VI-1930	T. KANZAWA	A	—	A	A
Yamaguchi Agr. Exp. Sta.	Tokusa-mura, Prov. Nagato	5-VII-1930	Tokusa Agr. Soc.	D.A	A	A	A
Agr. Exp. Sta., Gov. Gen. of Chosen	Tokusen, Heian-nando	3-VII-1930	S. MURAMATSU	A	—	A	—
Dept. of Agr., Gov. Res. Inst. of Formosa	Taihoku, Taiwan	13-IV-1930	J. SONAN	D	—	—	—

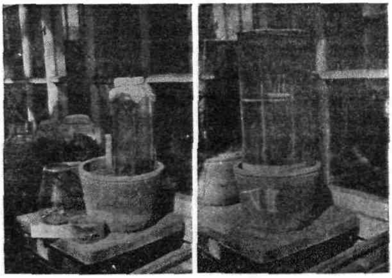
For comparison, I examined the following exotic specimens of *Lema melanopa*.

Sender	Locality collected	Date of Collection	Collector	Kind of Specimen [1]			
				Adult	Egg	Larva	Pupa
Teiso ESAKI	Berlin, Germany	16-VII-1924	T. ESAKI	D	—	—	—
W. E. H. HODSON	Broadclyst, Devon, England	16-VI-1924	W. E. H. HODSON	D.A	A	A	—

1) "D" in the column of the kind of specimen means dried specimens and "A" means alcoholic specimens.

For morphological examination, I used both live and dried specimens, as well as those preserved in the 70 % alcohol. For detail study of fine structure, dissections were made under the PFEIFFER's preparation-microscope by means of fine and sharp needles. When necessary to soften the specimens previous to dissection, they were boiled in the 10 % potassium hydroxide for several minutes, followed by washing in running water and then placed in the glacial acetic acid. After these treatments they were put into the oil of cloves for a few minutes, and then mounted in xylol-balsam or "Euparal" on slide-glass. I examined the details of the structure under the LEITZ's microscope of "G-E" type.

For ecological observations, I made occasional visits to several localities, such as Higashi-Asahigawa and Kagura in the County of Kamikawa, Itchan in the County of Sorachi, and Teine near Sapporo, where the damages done by this beetle were great. For closer observations, I reared the leaf-beetle in a number of some kinds of breeding apparatus placed in a rearing room. I used always porous pot of 25 cm. in diameter and 15 cm. in height, or sometimes of 18 cm. and 15 cm. respectively, and after I filled a wet soil, set out the seedlings or sowed the seeds of rice or other cereals. On rearing, cylinder of wire-screen or glass-cylinder was covered upon the feeding plants. The cylinder of wire-screen is 20 cm. in diameter and 39 cm. in height, covered all over the wall and the top side with a fine mesh screen. One of the glass-cylinder is 10 cm. in diameter and 19 cm. in height, while the other is paper-lantern-shaped and is 12.5 cm. in diameter and 16.5 cm. in height, both covered on the top with a Victoria lawn. In some cases I used a PETRI-dish filled with moist sand, or a test-tube in which rice-leaves were placed.



Text-fig. I

Breeding apparatus used for ecological observations

IV. MORPHOLOGICAL CHARACTERS

1. Adult

(1) General Colouration

The head is shiny black and provided with yellowish white pubescence on the face, the vertex being slightly tinged with blue; the mouth-part is dark yellow in general, but the apices of mandibles dark reddish brown; the labrum, the basal parts of mandibles, the submentum and palpi blackish. The eye is mat black in colour. The antenna is blackish, and is densely covered with grayish yellow pubescence, mixing a few grayish yellow hairs, except the basal two joints, which are shiny dark brown on the upper and dark yellowish brown on the under surface. The prothorax is bright yellowish brown, sometimes changing to reddish brown colour, with the exception of the sternum and the anterior margin that are blackish. The nota of meso- and metathorax are shiny brownish black, but the scutellum is blackish, and the sterna of those are black, being covered with grayish yellow pubescence. The elytra are uniform metallic deep blue or cyaneous in colour, the hind wings are pale brown and the nervures are dark brown, some of them being yellowish. The colouration of legs is similar in three pairs; the coxa is black, the trochanter, femur and tibia are bright brownish yellow, the latter being darkened at the apex and provided with blackish spurs, the tarsus being dark brown, and the claw brownish black; the leg is also covered with grayish yellow pubescence, scarce on the coxa and femur and dense on the tibia and tarsi. The abdomen is shiny brownish black on the tergum and mat black on the sternum, the latter being densely covered with grayish yellow pubescence.

(2) The Dimensions

The rice leaf-beetle is a slender and moderate sized one among the Chrysomelids. There is some difference in shape between both sexes, the male being usually smaller and slenderer than the female. As in other species, this beetle differs widely in dimensions among individuals. I will first record my data on fifty specimens, each of different sex, obtained from various localities in Hokkaido and Honshu in the following table:

Table I—The dimensions of one hundred specimens of rice leaf-beetle

No.	♂			♀		
	Length of body	Width of body	Length of antenna	Length of body	Width of body	Length of antenna
	mm.	mm.	mm.	mm.	mm.	mm.
1	4.2	1.6	2.2	4.7	1.8	2.0
2	4.3	1.6	2.0	4.8	1.7	2.2
3	4.4	1.6	2.1	4.8	1.75	2.1
4	4.5	1.65	1.9	4.8	1.8	2.1
5	4.2	1.55	2.1	4.6	1.8	2.0
6	4.5	1.65	2.1	4.8	1.8	2.1
7	4.2	1.6	1.9	4.9	1.8	2.2
8	4.4	1.65	2.0	4.8	1.8	1.9
9	4.1	1.5	1.9	4.9	1.8	2.1
10	4.5	1.6	1.9	4.7	1.8	2.1
11	4.2	1.6	2.2	4.6	1.7	2.0
12	4.3	1.6	1.9	4.6	1.8	?
13	4.4	1.6	2.2	4.6	1.7	2.0
14	4.3	1.5	2.2	4.8	1.8	2.0
15	4.2	1.4	2.1	4.7	1.65	2.1
16	4.1	1.5	1.9	5.0	1.85	1.9
17	4.3	1.6	2.1	4.6	1.7	1.9
18	4.0	1.45	2.2	4.8	1.8	2.1
19	4.6	1.6	2.1	4.6	1.7	2.2
20	4.1	1.5	?	4.9	1.75	2.0
21	4.0	1.5	2.0	4.6	1.75	1.8
22	4.6	1.6	2.2	5.2	1.8	2.1
23	4.2	1.45	2.1	5.1	1.7	2.0
24	4.2	1.55	1.9	4.9	1.7	2.1
25	4.1	1.5	1.9	4.7	1.7	1.9
26	4.2	1.6	2.1	4.6	1.7	2.0
27	4.1	1.5	2.0	4.6	1.7	1.9

No.	♂			♀		
	Length of body	Width of body	Length of antenna	Length of body	Width of body	Length of antenna
	mm.	mm.	mm.	mm.	mm.	mm.
28	4.5	1.6	2.0	5.0	1.8	2.2
29	4.2	1.5	2.0	4.7	1.8	2.0
30	4.1	1.5	2.0	4.9	1.8	2.2
31	4.2	1.45	2.0	5.0	1.8	2.0
32	4.1	1.5	2.0	5.2	1.8	2.25
33	4.2	1.6	1.9	4.7	1.7	2.1
34	4.0	1.5	1.9	4.8	1.75	2.2
35	4.1	1.5	2.0	4.5	1.65	2.0
36	4.2	1.5	2.0	4.6	1.8	2.0
37	3.9	1.45	1.7	4.6	1.7	2.0
38	4.2	1.6	2.0	4.4	1.8	1.9
39	4.4	1.6	1.8	4.5	1.75	1.9
40	4.0	1.5	2.0	4.7	1.8	2.0
41	4.1	1.6	2.0	4.6	1.75	2.0
42	4.3	1.5	1.7	4.5	1.65	1.9
43	4.3	1.65	2.2	4.5	1.7	2.1
44	4.4	1.5	1.9	4.7	1.65	2.0
45	4.1	1.6	1.9	4.5	1.65	1.9
46	4.3	1.5	1.8	5.3	1.7	2.2
47	4.1	1.6	2.0	5.3	1.75	2.1
48	4.2	1.5	2.1	5.0	1.8	2.0
49	4.0	1.5	2.2	4.6	1.7	2.0
50	4.2	1.5	2.1	4.9	1.65	2.0
Average	4.23	1.55	2.01	4.76	1.75	2.04
Maximum	4.6	1.65	2.2	5.3	1.85	2.25
Minimum	3.9	1.4	1.7	4.4	1.65	1.9
Range	0.7	0.25	0.5	0.9	0.2	0.35

As shown in the above table, the variation in the dimensions occurs similarly in both sexes, that is the percentage-ranges of variations between the extremes, as compared with the averages, are 16.5 per cent in the male and 18.9 per cent in the female on the length of body, and 16.1 per cent in the male and 11.4 per cent in the female on the width of body. The size of the female is much larger than that of the opposite sex, being the average-ranges of 0.53 mm. and 0.20 mm. in the length and width respectively. However, the ratio of the length to the width resembles very much between both sexes, as represented by 2.75 : 1 in the male against 2.72 : 1 in the female.

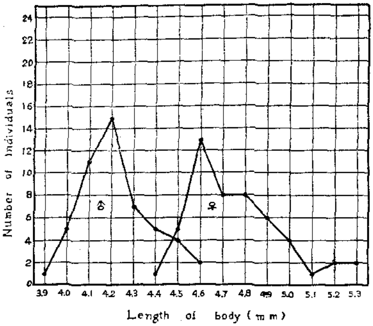


Chart I

Variation in the body-length of the adult

(3) The Structure

The Head [Pl. I-fig. 1] The head of this insect is comparatively small; it is about wide as the prothorax, and is not much elongated or constricted towards the mouth-part, being about 0.95 mm. in width and 0.8 mm. in length. The vertex is often covered by the prothorax, and is smooth with a few very minute punctures, and is not pilose. The frons is slightly raised and impressed with rather a short but distinct longitudinal groove in the middle of the smoother upper part; its lower part is provided with a few coarser punctures and sparse pubescence; on

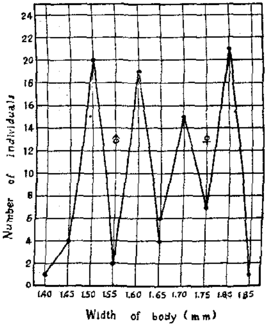


Chart II

Variation in the body-width of the adult

each side of the frons there is a deep hollow along the eye, the lower ends of both hollows being combined at the top of the clypeus. The part between the hollow and the eye is covered with rather dense pubescence. The clypeus is distinct from the frons, triangular in shape, sparsely punctured and is covered with dense pubescence. The genae are not broad and covered with dense pubescence; the temporae or postgenae are well developed and smooth with fine crinkles and sparse punctures; the gula is trapezoid in shape, smoothly polished, and bordered at the temporae by deep gular sutures (Sutura gularis).

Lateral to the frons there is a pair of large hemispherical compound eyes or oculi; the facet of ommatidia are hexagonal as usual and about 0.02 mm. in length; the oculata is narrow around the margin of the eye. Between the eyes, anteriorly from the lower part of the frons, arises a pair of antennae, the bases of which are separated. The antenna is filiform, the length being about 2.0 mm. in the male and 2.1 mm. in the female, and with eleven joints including the scape. The scape is elongated, longer than the third joint but shorter than the fourth, and the broadest among the antennal joints; the pedicel is the shortest and equally wide and long; these basal two joints are smooth and shiny with a few hairs; beyond the pedicel we find nine joints of the flagellum, which are cylindrical with the exception of somewhat cone-shaped terminal one, and each ventro-apical margin of the sixth to terminal joints is dented, thus often making the apical half of the antennae a curve downwards or inwards alive or dead. Each flagellum is provided with about four setae on the distal part, and is coverd with pubescence densely on the whole surface; the interjoint-membrane is brownish in colour, only visible by dissection. The flagella are gradually broadened towards the distal joint; the terminal and fifth joints are the longest of all, followed by the sixth to tenth joints, then the fourth joint which is three-fourths as long as the fifth, and the third joint is the shortest. The following data are average of eight examples of males and four of females measured by me on the specimens from Hokkaido.

Table II—*The measurements of the antennal joints of the rice leaf-beetle*

Joint	♂				♀			
	Length	Width	Ratio of length to width	Length-ratio to the pedicel	Length	Width	Ratio of length to width	Length-ratio to the pedicel
	mm.	mm.			mm.	mm.		
I (Scape)	0.162	0.132	1.23	1.69	0.168	0.141	1.19	1.83
II (Pedicel)	0.096	0.094	1.02	1.00	0.092	0.096	0.96	1.00
III (Flagellum)	0.150	0.095	1.58	1.56	0.160	0.093	1.72	1.74
IV (")	0.174	0.096	1.81	1.81	0.180	0.096	1.88	1.96
V (")	0.233	0.102	2.28	2.43	0.239	0.100	2.39	2.60
VI (")	0.213	0.116	1.84	2.22	0.208	0.110	1.89	2.26
VII (")	0.213	0.121	1.76	2.22	0.214	0.112	1.91	2.33
VIII (")	0.210	0.125	1.68	2.19	0.208	0.113	1.84	2.26
IX (")	0.205	0.120	1.71	2.14	0.208	0.108	1.93	2.26
X (")	0.199	0.125	1.59	2.07	0.208	0.114	1.82	2.26
XI (")	0.234	0.118	1.98	2.44	0.240	0.112	2.14	2.61
Total length	2.091				2.125			

The mouth-part [Pl. I-figs. 2 & 3] is formed typically for biting. The labrum is a distinct and chitinized transverse plate, connected with the lower margin of the clypeus, blackish in colour, with a few short hairs and punctures at the basal side. It is about 0.26 mm. in width and 0.13 mm. in length, and roundly ended at the apical margin with a deep impression in the middle; the inner side is provided with moderate dense pubescence. The mandibles are stout, at the outer margin being convex and at the inner concave, thus making a sharp apex, and there is an obtuse dentation at the middle of the inner margin of the right mandible. The length is about 0.24 mm. and the width at the base is about 0.15 mm. The maxillae are rather complex. Each cardo is an inverted cone in shape, and is apparently articulated to the submentum; the stipes is short and cylindrical, and its upper end leans outwardly and is concave, 0.11 mm. in length and 0.10 mm. in width, provided with a few short hairs; the palpifer is short and narrow, with a few short hairs. The lacinia, or the inner lobe

is composed of its ground-body framed with subgalea, ovoidal in shape, measuring about 0.08 mm. in length and 0.06 mm. in width; the inner margin of the lacinia is decked with beautiful tufts of long hairs of about 0.08 mm. in length, which appear like a brush; the maxillary palpus is very conspicuous and four-jointed; the basal joint is very short, the second and third subequal, the terminal obtuse conical, and as long as the rest of the palpus; the third is provided with a long bristle at the outer apex. The measurements of these joints are as follows:

Table III—*Measurements of the maxillary palpus of the adult*

Joint	Length	Width	Length-ratio to the first joint
	mm.	mm.	
I	0.020	0.042	1
II	0.056	0.064	2.8
III	0.042	0.064	2.1
IV	0.112	0.053	5.6

The submentum is trapezoid in shape, the length being 0.19 mm., the width 0.16 mm. at the upper edge and 0.24 mm. at the lower edge, provided with fine but rather sparse punctures and pubescence; four large punctures along both sides. In the labium, the mentum is well-developed and transverse, with a few punctures; its upper margin is deeply dented and concave; the prementum and palpiger are also developed. The ligula is rather long, its anterior edge being entire, with a shallow depression at the middle, and is fringed with thick hairs, as in the lacinia. The labial palpus is three-jointed, somewhat homologous with the maxillary palpus, the basal one is very short, the terminal very long; the latter joins at the apical part of the inner side of the second, thus giving the palpus a geniculate form. The measurement of the joints are as follows:

Table IV—*Measurements of the labial palpus of the adult*

Joint	Length	Width	Length-ratio to the first joint
	mm.	mm.	
I	0.028	0.048	1
II	0.064	0.039	2.3
III	0.090	0.042	3.2

The Thorax Among the thoracic segments the prothorax is the largest and is freely movable. The prothorax [Pl. I-fig. 5] is subcylindrical, lacking the lateral margins; its length is as long as the width which is subequal to that of the head; it is distinctly constricted just before the base; a perpendicular space occupies the deepest part of the constriction, being provided with deep punctures, a rather conspicuous transverse groove at a short distance in the front of the basal margin; the anterior and posterior margins are parallel; seen from the side both margins draw near towards the venter, thus becoming narrower towards the lower part; pronotum is composed of a single sclerite and scattered with rather coarse punctures, shiny but not pilose; its chitinous shield covers the whole of the dorsal and lateral regions, a distinct pleuron being hardly visible. The pleurosternal sutures are distinct; prosternum is rather small, with close punctures and dense whitish pubescence. The coxal cavities are entire. They are closed behind by a meeting of the epimera, the structures of which are homologous with those of the prosternum; the episternum is narrow. The meso- and metathorax are fused together as in the ordinary feature; they are wide and about 1.7 times as broad as the prothorax; the mesothorax is considerably reduced, while the metathorax is largely developed. We can easily recognize praescutum, scutum, scutellum and postscutellum in the notum of mesothorax. The praescutum is narrow and connected with the scutum perpendicularly; the scutum is large and rather rectangular in shape, about 0.38 mm. in width and 0.24 mm. in length, its anterior margin is concave and the hind margin convex posteriorly, and the median furrow being distinct, the surface shagreen, but not pilose, while the postero-lateral sides are provided with whitish pubescence; the scutellum is subtrigonate and curved upwards at about two-thirds behind, and is provided with moderate coarse punctures and whitish pubescence; its posterior apex is dilated, with a thick, impunctated linguiform attachment, so the apex is angulated; the postscutellum is narrow and sharply pointed at the sides. With exception of the posterior half of scutellum, the entire dorsal surface of mesothorax is covered by the prothorax and elytra. The mesosternum is narrow and trapezoidal, being situated in the front of the large mid coxal cavities which are closed; the meso-episterna are triangular in shape; the sternum and episterna both are closely punctured, with rather long dense pubescence. The meso-epimera are subequal in shape with the episterna and are provided with close punctures but not pilose; the parapteron or anterior wing process is rather small. The notum of the metathorax [Pl. I-fig. 10] is shiny and lacks punctures; the praescutum is a sclerite of

narrow and transverse form, extending all over the whole front of the scutum and scutellum; the scutellum is a sclerite of long and narrow rectangular form, situated at the middle of notum, its apex extending to the postnotum, three longitudinal keels are running on its surface. The *scutum, which constitutes the largest portion of metanotum,* is quadrate in shape and is divided by the scutellum into two plates, each being slightly elevated at the discal portion; the postnotum or postscutellum is very narrow; the parapteron or posterior wing process is comparatively large. The metanotum is wholly covered by the elytra. The metasternum [Pl. I-fig. 6] is a large subquadrate plate, the middle of the anterior margin is produced and that of the posterior is deeply dented; its median furrow is distinct, but it does not reach to the anterior margin of the sternum; posterior to the sternum we find the hind coxal cavities which are separated; the surface of metasternum is scattered with whitish, tolerably long pubescence and fine punctures; the metapoststernum, if my orientation be correct, is a narrow region of the identical character to the metasternum; at the middle dent of the hind margin of metasternum a pair of stout processes are provided. The meta-episternum is a comparatively large and elongated sclerite, lateral to the metasternum; it is cuneiform in shape, and adjoins to the epimerum by a longitudinal keel, and is covered with close punctures and long pubescence; it is divided into two pieces, respectively praeepisternum and post-episternum, the former is triangular and the latter subrectangular in shape. The meta-epimeron is elongate, being provided with punctures and pubescence as in the episternum. The thoracic spiracles are elliptical in shape, and are larger than the abdominal spiracles.

The elytra [Pl. I-fig. 7], the highly modified fore wings, are elongate and wholly cover the abdomen, and the surface is convex, somewhat thinner compared with that of *Lema melanopa*, shining but not pilose; both sides are parallel and roundly ended at the apex; the elytral suture is straight; near the base and across the suture, there is a transverse depression, which is shallow and ill-defined; the shoulders are angulated and obliquely notched; the surface is deeply impressed with regularly striated punctures set in about eleven rows on each elytron, while the shoulders are impunctate; the punctures are large except those in the basal space adjoining the shoulder; besides these striated punctures, the surface of elytron is scattered with shallow and minute pu .ctures. The number of the striated punctures in each row is not constant, not only among the individuals but even in both elytra of one individual. I examined ten elytra in calculating the number of the punctation, and the data are tabulated in

the following table.

Table V—*Number of the striated punctures in each elytron*

Row from the inner side	Maximum	Minimum	Average
I	10	7	7.8
II	41	30	34.4
III	37	31	33.0
IV	40	29	32.9
V	34	26	29.9
VI	34	26	30.2
VII	34	27	30.4
VIII	34	26	29.5
IX	35	27	31.1
X	41	34	35.8
XI	41	32	36.4

Laterally seen, the edge of the elytron is slightly concave at the middle, and the epipleuron is very narrow and indistinct, slightly projected below the shoulder, and gradually tapers towards the apical portion. The ratio of the length to the width in each elytron is about 3.1 : 1, being similar in both sexes. The data examined are as follows:

Table VI—*The length and width of the elytron*

Sex	Number of examination	Length			Width			Ratio
		Max.	Min.	Average	Max.	Min.	Average	
♀	4	mm. 3.60	mm. 3.50	mm. 3.55	mm. 1.15	mm. 1.15	mm. 1.15	3.09 : 1
♂	10	3.35	3.25	3.28	1.15	0.95	1.04	3.15 : 1

The wings [Pl. I-fig. 11], or the hind wings, are large, membranous and folded beneath the elytra, as in the ordinary feature. They are elongate and

somewhat fan-shaped, hyaline, but slightly darkened with a brownish tint and are densely provided with fine cilia all over the surface; the marginal fringe is very short and colourless; the apex is bluntly pointed and the hind margin is slightly dented at the terminals of nervures. Each wing measures about 4.5 mm. in length and 1.9 mm. in width, and the nervures are well modified. The costa lies along the costal edge of the wing extending as long as the basal half of the costal margin; the subcosta is easily recognizable as a concave nervure, fusing with the costa at the basal and distal portions. The third nervure from the costal edge is a well developed and curved radius, and terminates at the five-ninths basad of the costal margin. The above three nervures are closely crowded at the base of the costal margin of the wing and form the principal articulation with the posterior wing-process, from which the wing rises. The marginal portion of the wing in the neighborhood of the apical parts of the subcosta and radius is thickened, also the nervure is obese itself, and forms the pterostigma. Near the base of wing the arculus is distinct, and to the radius a faint nervure is parallel. The basal part of the radial sector is atrophied, leaving the outer part as a backward-projection which is called as the central recurrent; the subrectangular central cell is formed beyond the apical part of the radial stem by two radial cross-veins; beyond the outer corner of the cell a short portion of the radial sector appears also like a detached dot. The second radio-medial cross-vein swings into the basal atrophied portion of the radial sector; about the half of the first radio-medial cross-vein is provided with a long process on the outer side, and the lower portion of the cross-vein is faint. The basal part of media fades out, leaving the main part of it; the apex curves downwards, fusing to the cubitus, and is known as the medial recurrent. The first media which fades out at the basal and apical portions, is only a representative in the nearly veinless apical region. The cubitus is strongly developed, running obliquely towards the outer margin and its terminal portion curves upwards; the medio-cubital cross-vein is smoothly connected with the curved apical portions of the media and cubitus; from the centre of this fused portion a straight and apically atrophied nervure, which is known as the fusion of the fourth media and cubitus, runs. The anal region is quite simple, only two distinct anal nervures being present. These may be identified as the second and third branches of the second anal; the second branch is simple and atrophied at the basal half, while the third branch is fully developed but curved upwards basad, and is associated with the third anal, which is rather fine and fused at the apical one-third of the

former anal branch.

The legs [Pl. I-fig. 14] are long and stout, adapted for walking. There is no distinct difference in structure between the fore, middle and hind legs; the hind leg is the longest and the fore leg is the shortest of all in both sexes; no distinct sexual difference in structure is traceable, except the larger sizes in three pairs of the female than those of the male in the dimension of their bodies. The length and width of the leg-segments measured are shown in the following table.

Table VII—*Length of the leg-segments of the adult*

Segment	♂			♀		
	Fore leg	Middle leg	Hind leg	Fore leg	Middle leg	Hind leg
	mm.	mm.	mm.	mm.	mm.	mm.
Coxa	0.372	0.384	0.600	0.368	0.448	0.741
Trochanter	0.164	0.168	0.160	0.176	0.168	0.168
Femur	0.896	0.952	1.024	0.928	1.008	1.093
Tibia	0.840	0.884	0.896	0.901	0.960	0.976
Tarsus	0.752	0.776	0.792	0.760	0.843	0.869
1st joint	0.236	0.240	0.252	0.229	0.256	0.272
2nd joint	0.156	0.164	0.164	0.160	0.187	0.155
3rd joint	0.196	0.175	0.192	0.208	0.213	0.208
4th joint	0.092	0.096	0.088	0.080	0.096	0.096
5th joint	0.260	0.304	0.296	0.296	0.325	0.331
Claws	0.116	0.132	0.132	0.120	0.155	0.144
Total	2.976	3.128	3.444	3.077	3.414	3.823

Note: Average of three individuals of each sex. Measured from the lateral aspect.

Table VIII—*Largest width of leg-segments of the adult*

Segment	♂			♀		
	Fore leg	Middle leg	Hind leg	Fore leg	Middle leg	Hind leg
	mm.	mm.	mm.	mm.	mm.	mm.
Coxa	0.300	0.320	0.268	0.288	0.315	0.267
Trochanter	0.124	0.134	0.140	0.128	0.144	0.144

Segment	♂			♀		
	Fore leg	Middle leg	Hind leg	Fore leg	Middle leg	Hind leg
	mm.	mm.	mm.	mm.	mm.	mm.
Femur	0.284	0.304	0.318	0.309	0.336	0.325
Tibia	0.148	0.156	0.156	0.155	0.165	0.165
1st tarsal joint	0.120	0.104	0.104	0.117	0.096	0.101
2nd tarsal joint	0.120	0.108	0.116	0.128	0.101	0.117
3rd tarsal joint	0.084	0.080	0.080	0.075	0.091	0.085
4th tarsal joint	0.060	0.060	0.061	0.048	0.053	0.072
5th tarsal joint	0.080	0.080	0.080	0.092	0.093	0.091
Claws	0.048	0.064	0.064	0.056	0.064	0.069

Note: The same as in the Table VII.

The legs are composed of the typical segments. The proximal segment or coxa is movable, globular in the fore and middle legs, and semicylindrical in the hind leg. The outer surface of each coxa is provided with fine punctures and moderately dense pubescence; the distal end of coxa possesses a pair of well chitinized coilae, and the trochanter is attached between the coilae to the coxa by a coria, the trochacoria. The trochanter *is short, subtriangular in outline, and bears a few hairs on its distal region.* The femur is the longest and the broadest of segments, spindle-shaped, being attained the broadest width at the middle, and bears moderately dense pubescence on the entire surface. The femacoria is reduced to an oblique immovable femasuture between well chitinized margins of the trochanter and the femur. The distal end of the femur is thickly chitinized and dilated into a flange-shaped fematroclia and blunt tibiartis, the tibiaflexis being inserted into the former. The tibia is also very long but slightly shorter and much slenderer than the femur, gradually dilating towards the distal end. The proximal portion of the tibia is acutely curved and dilated into a broad tibiacoria, which together with the tibia is articulated to the femur. The tibia is covered with many fine hairs, markedly longer and more denser on the ventro-distal part. At the ventro-distal end, two subequal, stout calcaria or tibial spurs, which are slightly curved inwardly and about 0.056 mm. in length, are provided. *Along the lateral margins of the* distal end of the tibia appears a series of about eight spine-like setae. The tarsus is five-jointed and covered with fine hairs and pubescence,

except the hidden fourth joint, which is polished; the ventral surface of the third joint is densely pubescent like a carpet. The third joint is bilobed and receives the minute fourth joint at its base, so that the fourth joint and the proximal part of the fifth joint are buried between the two lobes of the third joint. The fourth and fifth joints are anchylosed, the former being very small. The fifth joint is the longest of all, slender, slightly curved and broadened. It is followed in length by the first joint and then the third and second, but the first and second are much dilated distad, and each lobe of the third is flattened. The first joint of the tarsus, or the basitarsus, is articulated to the tibia by an insertion of the broad flexis into a cavity of the well chitinized tibiatroclia. The claws are very heavily chitinized, curved ventrad and sharply pointed, simple, much longer than the fourth tarsal joint, the basal parts joining with one another.

The Abdomen In the abdomen, seven tergites and five sternites, subcylindrical in shape, and roundly terminated at the apex, are clearly visible, but the so-called pygidium is not exposed. The sternites [Pl. I-figs. 12, 13; Pl. II-fig. 9] are heavily chitinized and provided closely with fine punctures, and are covered with dense pubescence. The first visible sternum which is really the third, is much larger than the others, and its proximal margin is much concave; from the centre of that sternum a large triangular intercoxal process is protruded; the first and second sterna known as the sclerites of coxal furrow, are crescent in shape, without punctures, and perpendicularly situated anterior to the third. The fourth, fifth and sixth sterna are of a transverse rectangular form tapering posteriorly in width. The seventh or terminal sternum is a transverse oval form and much narrower in width than the preceding sternum. The difference in the shape of this sclerite between both sexes is scarcely recognizable. The intersternal membrane is smooth, pale brown in colour and does not show any marking.

The measurements of the abdominal sterna are tabulated in the following table:

Table IX—*Size of the abdominal sterna of the adult*

Abdominal sternum	♂		♀	
	Width	Length	Width	Length
	mm.	mm.	mm.	mm.
3rd sternum	1.75	0.70	1.88	0.85
4th sternum	1.80	0.28	1.88	0.33

Abdominal sternum	♂		♀	
	Width	Length	Width	Length
	mm.	mm.	mm.	mm.
5th sternum	1.64	0.25	1.73	0.30
6th sternum	1.45	0.27	1.48	0.30
7th sternum	1.08	0.37	1.15	0.40

Note: Measured on the largest portion of the sternum.

The tergites [Pl. I-fig. 9], except the basal and the terminal ones, are transverse rectangular in shape, uniformly polished, subchitinous, scattered with a very few short hairs, and fringed with dense fine golden hairs along the hind margins. The first tergite is more membranous, with two pairs of transverse chitinous plates of the homogeneous character with those of other tergites. The seventh and eighth tergites are semicircular in shape, long, harder in texture than the other terga, the former tergite covering the latter in a lingual shape; the apex of the former slightly protrudes than the terminal margin of the latter; at the centre of the proximal part of the seventh tergite, there are two adjoined dark reddish oval regions finely wrinkled transversly but not pilose; the other part is provided only with fine pubescence, while the distal part is densely clothed with long hairs. The pleural membrane is light smoky in colour; the abdominal spiracles are oval in shape, and well defined by the chitinous rings.

The genitalia of both sexes are withdrawn deeply into the abdomen and concealed. Among the male genital organs [Pl. II-fig. 2], the penis is spatulate in shape, glossy yellow, and well chitinized, with a few fine punctures. Seen laterally, the lower margin is straight, while the upper margin is convex, sharply pointing at the apex; an oval apical opening is situated at the dorso-distal part. At the distal one-third of each lateral fold, there is a conspicuous S-shaped reddish brown marking. The average measurement of the ten individuals is 0.824 mm. in length and 0.243 mm. in height. The eighth sternite is comparatively large, separated in two sections, and is clothed with fine hairs along the distal margin, and forms so-called genital plate.

In the female genitalia [Pl. II-fig. 1], the eighth sternite or genital plate is solid and reddish brown, and is divided longitudinally into two sections; it has fine hairs along the posterior margin, and is fused with the ninth tergite, which is clearly shown by the chitinous rod or apodeme. At the centre of the posterior margin of the eighth tergite, its chitinous plate

which is clothed with hairs, is interrupted. The broad ovipositor is soft, and is provided at its apex with a pair of genital palpi. The genital palpus is a short dark brownish chitinous rod of about 0.16 mm. in length, 0.10 mm. in width and 0.06 mm. in height, provided with whitish hairs densely at the apex.

2. Egg

The Colouration The colour of the egg varies with the age of the embryo. Immediately after oviposition it is shiny yellow, soon darkening to brown, two or three days later it changes to brownish black until the time of its hatching.

The Size The length and width of the egg also vary considerably among individuals. The following table shows the result of the measurements of fifty eggs collected in various localities of Hokkaido and Yamagata, Ishikawa, Toyama and Yamaguchi Prefectures.

Table X—*Length and width of the egg of the rice leaf-beetle*

No.	Length	Width near narrow end	Width near broad end	No.	Length	Width near narrow end	Width near broad end
	mm.	mm.	mm.		mm.	mm.	mm.
1	0.775	0.325	0.375	15	0.800	0.350	0.425
2	0.775	0.300	0.350	16	0.800	0.325	0.400
3	0.750	0.300	0.350	17	0.825	0.350	0.425
4	0.750	0.325	0.350	18	0.800	0.350	0.400
5	0.800	0.350	0.400	19	0.800	0.350	0.450
6	0.800	0.350	0.400	20	0.800	0.350	0.425
7	0.750	0.325	0.350	21	0.825	0.375	0.450
8	0.800	0.275	0.350	22	0.800	0.350	0.400
9	0.750	0.300	0.350	23	0.800	0.350	0.425
10	0.750	0.300	0.350	24	0.850	0.375	0.450
11	0.825	0.350	0.400	25	0.800	0.400	0.450
12	0.825	0.350	0.400	26	0.850	0.350	0.375
13	0.825	0.350	0.400	27	0.850	0.350	0.400
14	0.800	0.350	0.400	28	0.800	0.350	0.425

No.	Length	Width near narrow end	Width near broad end	No.	Length	Width near narrow end	Width near broad end
	mm.	mm.	mm.		mm.	mm.	mm.
29	0.850	0.350	0.425	40	0.850	0.350	0.400
30	0.850	0.425	0.425	41	0.800	0.350	0.400
31	0.800	0.350	0.400	42	0.825	0.350	0.425
32	0.775	0.375	0.375	43	0.850	0.400	0.450
33	0.800	0.325	0.400	44	0.875	0.375	0.425
34	0.750	0.350	0.400	45	0.800	0.350	0.400
35	0.800	0.325	0.375	46	0.775	0.350	0.400
36	0.875	0.325	0.400	47	0.800	0.325	0.400
37	0.800	0.325	0.400	48	0.800	0.350	0.425
38	0.800	0.350	0.450	49	0.850	0.325	0.400
39	0.850	0.350	0.450	50	0.800	0.375	0.450
				Average	0.807	0.346	0.404
				Maximum	0.875	0.425	0.450
				Minimum	0.750	0.275	0.350
				Range	0.125	0.150	0.100

As is seen in the preceding table, the range between the maximum *and the mininum is quite wide, representing 15.5 per cent in the length,* 43.4 per cent in the width near narrow end and 24.8 per cent in that of near broad end, as compared with the averages. In a word, the width is more variable than the length. These variations may probably be due to the conditions of the oviposited places.

The Shape [Pl. II-fig. 4a] The egg is elongate ovoid in shape, rounded at the narrow end and somewhat angulated at the broad end. The length is about twice as much as the broadest width. It is covered with a glutinous secretion, which hardens on contact with air. The chorion is rather thick, and it does not show any marking or crinkle on the surface.

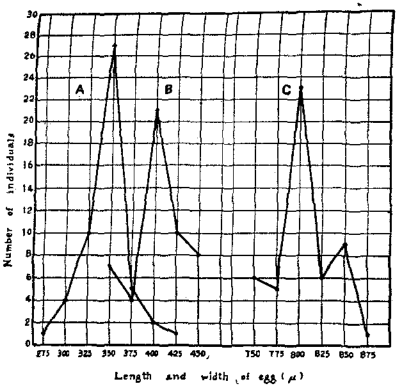


Chart III

Variation in the size of egg

Curve A
Width near narrow end

Curve B
Width near broad end

Curve C
Length

3. Larva

(1) Colour Description of Full-Grown Larva

The head is shiny black with a brownish tint, though paler on the lower half of the frons; around the neck, from the occiput to the antennal portions, there is a light yellowish band, the margins of which are irregular but well defined. The head is provided with brownish long setae; the eyes are yellowish; the mouth-part is generally blackish with reddish brown apices of mandibles and yellowish brown submental lobe. The body is pale bright yellow, but on account of minute brownish cuticular nodules and minute setaceous hairs covering the integument, it has assumed a dirty yellowish colour. The prothoracal shield, tubercles, spiracles and primary setae are brown; some dark brownish spots are scattered over the shield. The chitinous portions at the base of the articles of the thoracic legs are blackish; the proximal part of the first article, greater distal part of the second and whole of the third are coloured with brown, some brownish coloured portions resulting from the cloud of spots; the claws are yellowish brown.

(2) The Structure of Full-Grown Larva

The full-grown larva is eruciform and spindle-shaped, the fourth abdominal segment being the largest and gradually tapering towards the fore and hinder parts. The head is rather flat; the body is much flattened ventrad and conspicuously arched dorsad. It averages 4.7 mm. in the body-length, 2.1 mm. in the extreme width and 2.3 mm. in the extreme height.

The head [Pl. II-figs. 6 & 7] is directed obliquely forward and downward, strongly chitinized. The cranium is narrower than the prothorax, its extreme width in comparison with the extreme width of the prothorax being 2 : 3; when removed it is as broad as long, not including the mandibles; narrower in front than at the middle. The surface is polished but slightly wrinkled. The frons is obtuse triangular in shape, wider than long, the proportion of width to length being about 3 : 2; the sutural margins are distinctly limited but a little sinuate, the sutures of both sides being slightly convex at the anterior half and slightly concave at the posterior half, the posterior frontal angle obtuse. In the frons, there are two parallel rows of minute tubercular lines from the apex to the proximal one-fourth. Near the anterior margin of the frons there are four setae; two are exteriorly placed between the articulation of mandible and the base of antenna, the others are interiorly placed; outside the interior marginal setae two frontal punctures are situated; behind the interior marginal setae and towards the middle of frontal sutures there are two setae; we also find near the posterior angle two setae. The epistoma is represented by the thickened anterior margin of the frons, with which it is fused; it is dark in colour, with the anterior margin nearly straight, and the lateral angles slightly produced and elevated where they support the dorsal articulation of the mandibles. The epicranial suture is rather long, and the proportion of it to the length of frons being 1 : 1.1; epicranial setae consist of three setae of posterior group, two setae of anterior group, one seta of ocellar group and two setae of lateral group in each epicranium, and the epicranial punctures are represented by one in each the posterior and lateral groups. The clypeus is about seven times as wide as long, trapezoidal, with four setae near the proximal margin. The antennae are rather short, conical, apparently three-jointed, the basal joint is the largest in diameter, seven times as wide as long, with some tubercular processes around the joint; the second joint is narrower in diameter but longer in height than the basal joint, about three times as wide as long, with four conical processes on the apical surface; the apical joint is situated on the side of the apical

surface of the preceding joint, conical in shapè and nearly colourless, the proportion of the basal width to length being 1 : 2. The occipital foramen is very large and round; the gena is well developed and with one seta near the base. Four round and elevated eyes or ocelli are situated at the base of the epicranium, and arranged in semicircular shape. The labrum is trapezoidal in shape, about two and a half times as wide as long at the proximal portion, the width is much narrower than the clypeus, while the length is twice as long as the clypeus; at the middle of the anterior margin with a deep cleft, and between this cleft and the apical angles three notches are engraved at the margin; two rather shorter setae are placed close the anterior angle and the other two near the lateral margin. The mandibles are rather stout, triangular, with five teeth in two series on the anterior half of the upper and lower edges of the inner side; the apical tooth is larger than the others and acute, the subapical two and the third or median two teeth obtuse; the basal or molar teeth are not represented. The lateral area of the mandible has an impression and two long hairs. The maxillae are much complex and longer than broad; the cardo is distinct and transversely triangular, much chitinized; the stipes is long and rectangular; the palpifer is transverse and distinctly articulated; the lacinia interna is spoon-shaped and as long as the stipes, but much slenderer; the lacinia externa is well developed, bluntly pointed at the apex, and the inner face is armed with a number of stout lacinial setae; the maxillary palpi are three-jointed, conical in shape, gradually tapering towards the distal joints, while the lengths are subequal one with the other, and bluntly pointed at the apex of the terminal which is provided with a few sensory processes, each joint being provided with one or two setae on the side. The labium, in ventral aspect, has a large, membranous submental lobe, attached to and contiguous to the integument of the prothoracic sterna and laterally to that of the maxilla. The mentum is represented by a median semicircular chitinous plate and provided with two long setae on the inner disc; the mentum, palpiger and ligula are fused, and the labial palpi are short, conical, and only one-jointed, with a few sensory processes; the inner part of the ligula is membranous and contiguous with the pharynx.

The thorax [Pl. II-fig. 6] and abdomen are distinct, the former being composed of three segments, each bearing a pair of jointed legs, and the latter composed of ten segments, the last representing only the anal lobes. Except the dorsal plate of the prothorax and the tenth abdominal segment, the body-wall is beset densely with brownish cuticular nodules; behind the posterior half of the metathorax to the ninth abdominal segment, each

nodule is provided with a short curved setaceous hair with the exception of those on the ventral sclerites [see Pl. II-fig. 8]. These setaceous hair are no doubt convenient to cover the excreta over the body.

The prothorax is modified dorsally into a strongly chitinized prothoracal or cervical shield, which is rectangulur in shape and divided into two lateral parts by the dorso-median line. Each plate of the shield is scattered with many dark brownish spots; five prominent setae are arranged along the anterior margin and the three along the posterior margin, each seta being sprouted from a brownish round small tubercle. From these setal arrangement, it is recognizable that the shield is formed by the fusion of tubercles I to VIII. Ventro-lateral tubercle, which bears two prominent setae and formed by the fusion of IX and X, is large and transverse. The round tubercles XI and XII, each bearing one seta as in the other thoracic segments, are associated with the base of the leg; the ventral tubercle XIII is small, and possesses a short seta.

The meso- and meta-thorax are exactly like each other, on the former segment a spiracle is present above the anterior ventro-lateral tubercle (IX). There is one dorsal suture on each segment; on each side behind this suture five setae, which are represented dorsal and dorso-lateral tubercles, are arranged in a line, the tubercles becoming gradually smaller towards the upper, and the first dorsal one being non-chitinized and setiferous only. The large lateral tubercle bears three large setae, which may be interpreted as a fusion of tubercles VI, VII and VIII; a round anterior and a round posterior ventro-lateral tubercles, IX and X respectively, each bears a large seta; an anterior and a posterior basal tubercles, XI and XII, are associated with the base of the leg, the former being weakly chitinized and with a short seta, the latter bearing one large seta; an anterior and a posterior ventral tubercles, XIII and XIV respectively, are both on the venter, the former being very small, and only setiferous, while the latter is large and has two setae. The mesothoracic spiracle [Pl. II-fig. 8] is comparatively large, slightly raised with a well chitinized margin, the ring is ovoidal in shape and at its upper margin has two unequal tubercular processes.

The legs are similar in three pairs and each composed of five joints; conical in shape, gradually tapering towards the apical joints. The proximal and second joints fit closely into a socket fc med by an infolded body-wall with which they are continuous, and provided with several setae, thus it is hard to recognize these joints from the outer side. The third joint or the apparent first article is large and less chitinized, with two long

setae on the outer side, while it is margined at the anterior and posterior proximal portions with chitinous ring-shaped plate hoisted at the outer side. The fourth joint is chitinized, cylindrical in shape, with two setae at the externo-distal portion and more than five at the inner side. The distal joint is short, strongly chitinized, provided with two long setae at the externo-proximal portion and the four at the apical margin, and bears a single inwardly curved claw and one sensory process situated at the inner apical side.

The abdominal segments, from the first to the seventh, have the identical arrangement of setiferous tubercles and one dorsal suture. An anterior dorsal (I) and an anterior dorso-lateral (III) tubercles are situated before the suture, the latter being non-chitinized and setiferous; a posterior dorsal (II) and two dorso-lateral (IV and VI) are arranged in one series, similar in shape, each with a long seta; two lateral tubercles (VII and VIII) are situated obliquely near each other; the ventro-lateral tubercles are composed of three isolated ones around the spiracles, the one being situated above and the others behind; a basal tubercle is situated far below the spiracle, lacking the ventral tubercles. The eighth abdominal segment is similar to the ones above mentioned, but the arrangement of the setiferous tubercles is slightly modified. The ninth abdominal segment is not modified into an anal shield dorsally, and bears six setae on each side. The tenth abdominal segment is very small, having no tubercles nor setae, but with an anal process. There are eight pairs of the abdominal spiracles, borne just below the tubercle IX on the first eight abdominal segments; they are homogeneous with the thoracic spiracles, but rather smaller except the pair of the first abdominal segment, the size of which is apparently similar to that of the thoracic one.

(3) Description of the Newly Hatched Larva and the Change during Growth

The newly hatched larva has a similar colouration to that of the full-grown larva in general. However, the head is entirely blackish, with no yellowish band around the neck; and the distal three joints of thoracic legs are almost brownish black, without markings; and the prothoracal shield is entirely brownish. The arrangements of setae and tubercles are apparently the same, but a little closer; the head being comparatively large. The inner teeth of mandibles, as well as the apical one are rather sharp. The colouration above mentioned is also the same in the second and third instars.

4. Pupa and Cocoon

(1) Pupa

The Colouration The pupa is bright yellow in colour when first formed. After a few days, the colour of wing-pad changes to a deep yellow, while the other parts change to rather a light yellow. On the eve of emergence the eyes become brownish black in colour and the apices of mandibles are tinged with reddish brown. At this time the dorsal parts of abdomen change also to dark colour.

The Dimensions The size and shape of the pupae differ according to their future sexes. The data of the length and the width measured are as follows:

Table XI—*The length and the width of the pupa of the rice leaf-beetle*

No.	♂		♀	
	Length of body	Width of body	Length of body	Width of body
	mm.	mm.	mm.	mm.
1	3.6	2.1	4.4	2.4
2	3.8	2.1	4.6	2.1
3	3.9	1.8	5.0	2.3
4	3.9	2.0	4.2	2.1
	4.0	2.1	4.4	2.0
6	4.0	2.3	4.4	2.3
7			4.2	2.2
8			4.4	2.2
9			4.5	2.2
10			4.2	2.0
Average	3.87	2.07	4.43	2.18
Maximum	4.0	2.3	5.0	2.4
Minimum	3.6	1.8	4.2	2.0
Range	0.4	0.5	0.8	0.4

As is seen in the above table, the pupa to be transformed into the female is larger and more elongate than that of the male. The ratio of

the length and the width is 2.03 : 1 in the female and 1.82 : 1 in the male.

The Structure The pupa of the rice leaf-beetle is typical "pupa libera", enveloped in a thin transparent membrane. It is spindle-shaped, somewhat flattened at the ventral surface and slightly convex at the dorsal surface. The head is bent ventrad; three thoracic segments are distinct; eight abdominal segments in addition to the anal plate are visible. The wing-sheaths cover the ventro-lateral sides of abdomen, and their rather sharp apices are extended to the middle of the fifth abdominal segment in the female, and to the distal end of the sixth in the male. The body is nude, almost wanting the setae on the surface. The head is rather small but produced. On the vertex there are two oblique protuberances; the eye-portions are also raised. The antennal sheaths are long and curved dorsally, the apices being extended to the proximal one-third of the elytral sheaths, and the jointed rings distinct. The clypeal portion is transverse, while the labrum is semicircular and dented at the centre of the free margin. The mandibles are rather long and stout, situated at the lateral sides of the mouth-part, the apices are separated widely; the other portions of the mouth-part, such as, maxillary palpi, labial palpi, glossa, etc., are visible behind the mandibles, the apices of them being not longer than the apices of the latter. The prothorax is semicylindrical dorsad, with a transverse furrow dorso-basad and a small tubercle near the centre of dorso-posterior margin; the anterior margin extends around the vertex, and is provided with a pair of tubercles at the middle. The apex of the hind tarsus is slightly protruded beyond the apex of the wing-sheath. The fore and middle legs are exposed over the wing-sheath, both being subequal, and the femora and tibiae are transversely parallel; the hind legs are under the wing-sheath, and the tarsi which situated ventrad between the wing-sheaths are only visible. Both anterior and posterior wing-sheaths are similar in shape and size, making the apices of uniform length. Several rows of longitudinal stripes are visible on the elytral-sheath. The mesonotum is quadrate in shape, the larger part being represented by the mesoscutum, and near the centre of the posterior margin there is a prominent tubercular process which is undoubtedly the mesoscutellum. The metanotum is much larger than the mesonotum, transverse and rectangular in shape, but the posterior margin is somewhat dilated at the centre. The metascutellum is recognizable as a central longitudinal deep furrow which extends the entire length of the notum. The lateral sclerite, divided by the metascutellum, is separated by a suture into two portions, that is, rather

smaller metapraescutum and larger metascutum. The abdomen is subcylindrical, and the segments are homogeneous and gradually taper towards the apex; a dark dorso-longitudinal line is visible. The abdominal spiracles are rather small and semicircular. The eighth segment bears a pair of inwardly curved caudal spines.

(2) Cocoon

The Form and Colour The cocoon is ellipsoidal in shape, and when it is formed on the surface of leaf, the side sticking is more or less flattened. It is compact but fragile in texture and is whitish in colour, sometimes being slightly tinged with a dull yellow or a pale brown. The outer surface of cocoon is not smooth, and we see frequently many tubercular processes over it, while the inner surface is entirely smooth.

The Size The size of the cocoon is variable among individuals. I examined fifty cocoons stuck to the rice-leaves, and the results are tabulated below:

Table XII—*Variation in the size of cocoons of the rice leaf-beetle*

No.	Length	Width	Height	No.	Length	Width	Height
	mm.	mm.	mm.		mm.	mm.	mm.
1	5.5	2.3	1.5	15	5.0	3.0	2.5
2	5.5	3.0	2.0	16	5.0	3.0	1.9
3	5.0	3.5	2.3	17	5.0	3.0	1.8
4	5.5	2.5	2.0	18	5.5	3.2	1.8
5	5.5	3.5	2.2	19	5.0	3.8	2.2
6	6.5	2.2	2.2	20	5.3	3.0	2.4
7	5.0	3.7	1.7	21	5.0	2.8	2.4
8	5.5	3.0	2.0	22	5.7	2.5	2.7
9	6.0	3.5	2.0	23	5.5	3.0	2.6
10	4.8	2.4	1.7	24	5.0	3.3	2.3
11	5.7	3.5	1.9	25	6.0	2.8	2.0
12	7.0	2.8	1.9	26	4.7	3.0	2.2
13	5.0	2.7	2.0	27	5.3	3.7	2.4
14	5.5	2.8	2.1	28	5.0	2.7	2.1

No.	Length	Width	Height	No.	Length	Width	Height
	mm.	mm.	mm.		mm.	mm.	mm.
29	4.5	2.5	2.2	40	4.7	2.5	2.2
30	5.5	2.5	2.5	41	6.5	2.5	1.9
31	5.0	3.0	2.5	42	7.0	2.8	1.8
32	4.7	2.7	2.1	43	6.0	3.2	2.0
33	5.0	2.5	1.9	44	6.0	2.5	1.7
34	5.5	3.0	2.3	45	5.7	3.2	2.1
35	5.2	2.8	2.2	46	4.7	2.4	1.9
36	5.0	3.0	2.1	47	5.5	2.5	1.7
37	5.0	3.0	2.2	48	5.7	3.2	1.9
38	5.2	2.3	2.0	49	4.5	2.7	2.0
39	4.3	2.7	2.3	50	5.0	2.5	2.4
				Average	5.34	2.88	2.08
				Maximum	7.0	3.8	2.7
				Minimum	4.3	2.2	1.5
				Range	2.7	1.6	1.2

As is seen in the above table, the range between the extremes is fairly wide. Resembling the case in the size of eggs, this variation may be due to the condition of the full-grown larva, pupating place, etc.

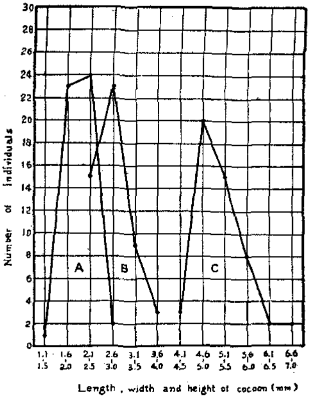


Chart IV

Variation in the size of cocoons

Curve A Height

Curve B Width

Curve C Length

V. ECOLOGICAL CHARACTERS

1. Number of Generations and Seasonal History

As already stated, there are various accounts on the number of generations, some claiming only one generation yearly for the rice leaf-beetle, some two, while others sometimes three generations. However, as far as my observations go, only one generation of this beetle is produced annually in our districts. This observation is in accord with those of H. OKAMOTO (*70*, *71*) in Hokkaido, J. MURATA and T. IKEDA (*59*) in Nagano Prefecture, R. NODZU (*67*) in Shimane Prefecture, J. OKADA (*69*) in Yamaguchi Prefecture, J. SONAN (*85–87*) in Taiwan, etc. According to the observations in Hokkaido, the rice leaf-beetle passes the winter as adults hidden away in the debris of the adjacent mountain-bush, under the roots of grasses of a wind-break, in the shallow part under a ground of the road-bank of the foot-path between rice-fields, and occasionally about buildings. They leave their winter-quarters quite early ir spring, and begin to feed on the leaves of young rice-plants and to pair. They may be found in the field even before rice-plants come up, in the latter part of May. In early June, the first eggs are laid in masses on the leaves of

rice-plant; June 8 was the earliest date recorded the egg-laying in 1930. The adults appear abundantly during the latter part of June, and the female may continue to deposit her eggs at least as late as the end of July, though the emergence of adult succeeded by the earlier oviposition begins to occur during this time. However, the overwintering adults are not common in the field after mid-July. The length of the egg-stage varies from one week to two weeks, the larval life occupies from thirteen to twenty days and on the average about two weeks, and the pupal stage also about two weeks. The earliest date on which I have found an adult of the new generation, was on July 22 in 1930, but the new generation of beetles does not become common until much later during this month or early in August. As the oviposition-period lasts more than one month, all stages of this beetle may be found simultaneously, but the adults which emerge in each summer neither pair nor oviposit until the next year, although they do feed freely on the foliage until mid-August when they seek hibernating quarters.

The life-cycle is shown in the following chart.

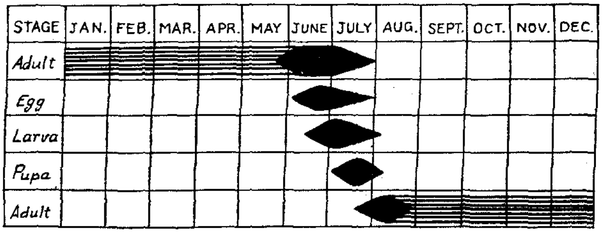


Chart V

Life-cycle of *Lema oryzae* in Hokkaido

2. On the Adult

Emergence In Hokkaido, as stated in the preceding pages, the emergence of adult under natural conditions occurs at the latter part of July and continues throughout August. This long duration of the emergence may be not only due to the difference of oviposition-period in the spring-time, but also to the nutrition during the larval stage, pupating place and

other conditions. The process of emergence takes place in the cocoon, and the newly emerged beetle stands still one or two days within. When the beetle is able to fly by the hardening of its exoskeleton, it cuts a round hole of about 1.5 mm. in diameter near one end of the cocoon and goes away. The newly flying beetle seeks hibernating quarters a short time after of its feeding freely on the foliage.

Duration of Life The adult-life is a long one. It is almost impossible to determine the length of the life of adult in the field, as this beetle hibernates in the adult-stage, and it is also doubtful whether the breeding experiments give a true estimation of the length of life or not. However, according to my observations on the beetles confined in the breeding cages in 1930, one of the longest survivors among the hibernating beetles was found on July 24, but by August 1 none could be found. From these experiments, we may say that the adult exhibits a considerable degree of longevity as about one year or a little longer.

Time of Appearance in Spring As mentioned previously, the adult usually reappear in the latter part of May in the vicinity of Sapporo. This date is almost the same everywhere in Japan, with the exception of Taiwan, in where, according to J. SONAN (*85–87*) it appears from early February. Some comparison are given as follows:

Table XIII—*Time of the appearance of adult in some localities in Japan*

Locality	The earliest date of appearance in spring	Observer
Kamikawa district, Prov. Ishikari	End of May	S. KUWAYAMA
Uriu district, Prov. Ishikari	„	„
Sapporo district, Prov. Ishikari	„	„
Kawabe district, Prov. Ugo	End of May — Early in June	Akita Agr. Exp. Sta.
Morioka, Prov. Rikuchû	Middle of May	Iwate Agr. Exp. Sta.
Yamagata, Prov. Uzen	End of May	Yamagata Agr. Exp. Sta.
Nagaoka, Prov. Echigo	„	Niigata Agr Exp. Sta.

Locality	The earliest date of appearance in spring	Observer
Nagano, Prov. Shinano	End of May — End of June	Nagano Agr. Exp. Sta.
Hinokawa district, Prov. Idzumo	End of May	Shimane Agr. Exp. Sta.
Yamaguchi, Prov. Suwō	End of May — Early in June	Yamaguchi Agr. Exp. Sta.
Kainei district, Chosen	May — June	Kankyō-Hokudo Agr. Exp. Farm

It may be noticed, as compared with other insects, that there is only slight difference on the reappearing dates in many localities, where climate varies considerably.

Mating [Pl. III-figs. 1 & 2] On the reappearance of the adult in spring, the mating commences on a warm day early in June. The mating seems rather unique. At mating, the male embraces the anterior portion of the abdomen of the female, so that its head comes in contact with the base of the elytra of the other party. The paired beetles stand still on the upper surface of leaves or stems, and they often wander about in this state, especially so when disturbed. The duration of mating varies greatly. In one case the mating lasted for one hour, but in other cases it continued two or three hours and sometimes longer. On this account my observations coincide with those of R. Nodzu (*67*). The mating occurs at any time in the day, especially during the warm and quiet daytime. The copulation of one male or female repeatedly takes place during its long life in spring. Not infrequently a female, just after pairing with a male, joins with another male. As I observed in many cases, the female contains generally very few fertile eggs in her ovaries as compared with the total number of eggs oviposited; thus to let the female keep up the prolific oviposition during her long life frequent mating may be needed. W. E. H. Hodson (*47*) stated in regard to *L. melanopa* that "it would seem that one union is sufficient, for females isolated immediately after copulating have continued to lay fertile eggs for a number of weeks". In these facts our leaf-beetle differs from *L. melanopa*.

Preoviposition-Period The preoviposition-period of our leaf-beetle is one of the longest among the insect-groups. As previously noted, the adults which emerge in summer, early or late in the season, neither pair nor oviposit unexceptionally until the next year. After eating the foliage of rice-

plant for some time, the newly emerged adults hide themselves and rest for a considerable time through three quarters of the year, that is, through summer, autumn and winter. This phenomenon has a different appearance from the ordinary hibernation or estivation of other insects. The fact that the annual generation is restricted to only one in spite of the differences of localities with different climatic conditions, and that the first appearances of the adults in spring in many localities are much the same, may be considered as special characteristics of this beetle itself. As O. NÜSSLIN and R. S. MACDOUGALL observed on *Pissodes* spp. of the Curculionidae, and as J. SONAN (*85*) regarded on *Morphosphaera* sp. of the Chrysomelidae, I suppose the sexual glands of this beetle may require a longer time for ripening after emergence, and so the beetle is only able to proceed to an efficient copulation in the following year. If this is the case, this characteristic is most adapted to the continuation of the generations. Really, this beetle has not a character of intermittent great outbreak, while its injury has a tendency to increase gradually year after year, or at least maintain the similar conditions.

Oviposition [Pl. II-fig. 5; Pl. III-fig. 2] Our observations show that the female oviposits only in daytime and never in the night. Eggs are usually placed on the upper surface of leaves, and occasionally they are found on the under surface of leaves and on the young shoots of the rice-plant. The following table shows the positions of egg-masses on leaves under natural conditions in 1930.

Table XIV—*Positions of egg-masses on the rice-leaves*

Number \ Position	Upper surface	Under surface	Total
Total number examined	356	18	374
Percentages of ditto	95.2	4.8	100.0

According to these observations, over 95 per cent of the egg-masses are placed on the upper surface of leaves, and it seems that the ovipositions on other parts of the plant are not normal.

The eggs are usually placed in mass, and when they are singly placed it is considered to be abnormal. The egg-masses are variable in shape, making a line, several rows or irregular form. However, the eggs rather

roughly stand in a mass.

When a beetle attempts to deposit eggs, it at first slowly walks about the surface of leaves, as if searching for a suitable place. If the place is found, the beetle extends its ovipositor, and lays a soft shiny yellow egg horizontally to the leaf. By exposure to air, the egg hardens rapidly its integument, and as it is covered with a glutinous secretion, the egg then adheres firmly to the leaf. The oviposition of one egg may take only a few minutes if circumstances are quite favourable. In an egg-mass, it lost usually not much time in succeeding ovipositions. If conditions are favourable, a female deposits more than ten or occasionally more than twenty eggs, or from one to five egg-masses, in a day. This fact was observed also by J. OKADA (*69*) in Yamaguchi Prefecture and by R. NODZU (*67*) in Shimane Prefecture. Contrary to these experiments on our species, W. E. H. HODSON (*47*) stated on *Lema melanopa* that "no female was observed to lay more than three eggs within 24 hours, one only being usual". His observation on *L. melanopa* that "during cool spells egg-laying was suspended entirely for several days at a time" was also recognizable in our case, but the difference in number of oviposition per day between *L. melanopa* and *L. oryzae* may be one of the noticeable facts in ecological point of view.

The number of eggs laid by a single female and the duration of egg-laying vary considerably among the individuals. Therefore, in 1930, I carefully observed with breeding glass-cylinders, in each of which a pair of the beetles was reared on the rice-plant. The results are detailed below:

Table XV—*The activities of the egg-laying of the adult in Hokkaido*

No.	Date of capture	The beginning of oviposition	The end of oviposition	Duration of egg-laying	Total number of egg-masses	Extreme number of eggs in an egg-mass	Total number of eggs laid	Average number of egg-laying per day
1	10/VI	12/VI	30/VI	18 days	5	2—17	33	1.8
2	"	"	1/VII	19	13	1—10	79	4.2
3	"	14/VI	"	17	9	2—9	39	2.3
4	"	17/VI	30/VI	13	13	1—9	37	2.9
5	"	11/VI	19/VI	8	3	2—17	64	8.0
Average				15.0	9.6		50.4	3.8

The above-mentioned observations show that a female in confinement deposited about fifty eggs, distributed in about ten egg-masses, during the egg-laying period which was fifteen days on the average. One of the females examined laid about eighty eggs during its life-time. However, this was much less than expected, probably owing to unfavourable conditions. The figures mentioned above show much less than those obtained by R. NODZU (*67*) and J. MURATA and others (*59, 61*), but much more than that of J. OKADA (*69*). For reference, some examples observed by these students in Shimane, Nagano and Yamaguchi Prefectures, are tabulated as follows:

Table XVI—*Activities of the egg-laying of the adult in different localities*

Locality observed	Year	Number of observed female	Duration of oviposition		Total number of egg-masses laid		Total number of eggs laid		Observer
			Average	Extremes	Average	Extremes	Average	Extremes	
			days	days					
Yamaguchi	1911–'12	20	—	—	3.2	2– 6	21.7	16– 38	J. OKADA
Shimane	1921	6	29.0	12–45	27.5	8–44	152.8	85–211	R. NODZU
"	1922	5	19.0	12–24	25.0	4–36	97.2	20–134	"
Nagano	1925	—	—	—	15.0	10–40	150.0	80–200	J. MURATA & others

According to these observations as well as my own, female in the field under more favourable conditions may be able to lay more than one hundred eggs during the period from about half a month to a month. The daily rate of oviposition varies with the differences of individuals and temperature. In some instances a single female deposited several egg-masses within 24 hours, whereas in other instances a period of several days was elapsed between the successive depositions of egg-masses.

It is also noticeable that the female in confinement frequently deposited her eggs on the interior of glass-cylinder and wire-screen as well as on the leaves of plants which were provided for egg-deposition. However, this tendency becomes conspicuous only when the host plants turn to droop, or some wrong plant is used.

General Behaviour [Pl. III-fig. 1] The adult-beetle is rather sluggish in habits, usually resting on the upper surface of the rice-leaves. However, it is diurnally active and flies freely when it is warm and calm. When the

beetle feels a slight danger approaching, it simply removes to the neighbouring leaves by walking, but if it is much disturbed, the beetle falls down to the surface of water or the ground, feigning death for a few seconds, and then runs or flies rapidly for other places.

The beetles, as in *L. melanopa* after the observations by W. E. H. HODSON (*47*), show at all times a gregarious tendency. This character is most marked in June, when the beetles assemble in groups for the purpose of mating. The beetles also invariably prefer sunny places, so the ovipositions are less on the rice-plants along shady foot-path. It is less active in cloudy and windy wheather, resting on the under surface of leaves or shelters in a grass-shade.

J. SONAN (*86*) stated that when the adults are in taking up winter-quarters, they are attracted by the artificial light in evening, from two or three to ten beetles being attracted every day by the lamp of mountain-cottage in Taiwan. Unfortunately, I have not met such a case in Hokkaido.

The beetle feeds on the leaves of rice-plant during its active time. However, in every spring, when the rice-plant is not yet grown, the beetle feeds temporarily on other Gramineous plants. On the feeding habits I intend to discuss later once more.

3. On the Egg

Incubation The length of the egg-stage varies according to temperature, weather and place of oviposition. During the middle of June in 1930, I observed the incubation-period upon two series of eggs on the rice-plant, one of which was placed in an ordinary breeding house, while the other in the green house. The results obtained are as follows:

Table XVII—*The incubation-period of the rice leaf-beetle*

Series	Date of egg-laying	Date of hatching	Incubation-period	Daily mean temperature during incubation-period
In ordinary breeding house	11/VI	22/VI	11 days	16.1 °C
	12/VI	21/VI	9	16.2 C
	20/VI	27/VI	7	16.9 C
In green house	13/VI	18/VI	5	21.5 C

As is seen in the preceding table, the higher temperature has a tendency to help the acceleration of the incubation-period of egg. In the field in the vicinity of Sapporo, the incubation-period varies usually from one to two weeks.

During incubation, the colour-change of the egg is due to the development of the embryo. The egg when laid is shiny yellow, and as stated before, the colour soon changes to brown, and within two or three days it becomes blackish brown or nearly black prior to hatching.

Number of Eggs per Egg-mass The majority of the egg-masses collected in the field in Hokkaido have contained from three to twelve eggs, although the number of eggs per egg-mass is considerably variable. From one to forty-six eggs have been found in an individual egg-mass. The following table gives the data obtained in 1929 and 1930 on the material from Kagura, Kamikawa district and Itchan, Uriu district, both in the Province of Ishikari.

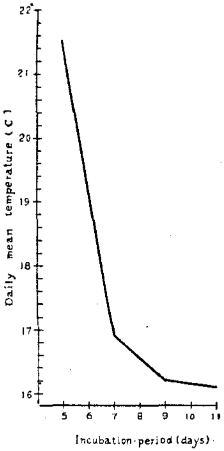


Chart VI

Relation between the incubation-period and temperature

Table XVIII—*Variation of number of eggs per egg-mass*

Class (Number of eggs per egg-mass)	Material in 1929		Material in 1930	
	Frequency	Percentage	Frequency	Percentage
		%		%
1	5	0.25	6	1.37
2	72	3.60	23	5.24
3	122	6.10	25	5.69
4	148	7.40	32	7.28
5	167	8.35	3[illegible]	7.97
6	172	8.60	28	6.38
7	199	9.95	42	9.57

Class (Number of eggs per egg-mass)	Material in 1929		Material in 1930	
	Frequency	Percentage	Frequency	Percentage
		%		%
8	168	8.40	36	8.20
9	168	8.40	41	9.34
10	139	6.95	41	9.34
11	112	5.60	28	6.38
12	117	5.85	21	4.78
13	91	4.55	15	3.42
14	69	3.45	15	3.42
15	66	3.30	18	4.10
16	46	2.30	8	1.82
17	42	2.10	8	1.82
18	29	1.45	4	0.91
19	24	1.20	3	0.68
20	11	0.55	4	0.91
21	13	0.65	—	—
22	8	0.40	—	—
23	3	0.15	1	0.23
24	2	0.10	2	0.46
25	—	—	—	—
26	2	0.10	—	—
27	1	0.05	—	—
28	—	—	—	—
29	2	0.10	1	0.23
30	—	—	—	—
31	1	0.05	—	—
32	—	—	—	—
33	—	—	—	—
34	—	—	—	—
35	—	—	—	—
36	—	—	—	—

Class (Number of eggs per egg-mass)	Material in 1929		Material in 1930	
	Frequency	Percentage	Frequency	Percentage
		%		%
37	—	—	—	—
38	—	—	—	—
39	—	—	1	0.23
40	—	—	—	—
41	—	—	1	0.23
42	—	—	—	—
43	—	—	—	—
44	—	—	—	—
45	—	—	—	—
46	1	0.05	—	—
Total	2000	100.00	439	100.00

These data can be represented graphically by the curves which are shown in the Chart VII. The figures on the ordinate show the number of individuals, and those on the abscissa the number of eggs per egg-mass. These data[1] give, in the whole, an asymmetrical curve of moderately distributed type, the maximum frequency being attained at the seyen eggs-class.

1) Based on the data obtained in these two years, I endeavored to calculate some values regarding variations. On the calculation, I am indebted to Dr. M. TAMBO for his kind advice. The results are as follows:

		For the material in 1929	1930
Mean (M)	$= G + \frac{\Sigma[f(V-G)]}{n} =$	8.908	8.763
Median (me)	= (By the proportional part) =	8.208	8.286
Mode.	$= M - 3\,(M - me) =$	6.809	7.332
Standard deviation (σ)	$= \pm\sqrt{\frac{\Sigma[f(V-G)^2]}{n} - b^2} =$	±4.361	±4.958
Standard error of σ	$= \pm\frac{\sigma}{\sqrt{2n}} =$	±0.069	±0.167

Note: Symbols in the formulae indicate as follows:—

Σ = Summation; G = assumed mean; n = total number of variates;

f = number of variates in the class or frequency; V = class value;

$b = \frac{\Sigma[f(V-G)]}{n}$

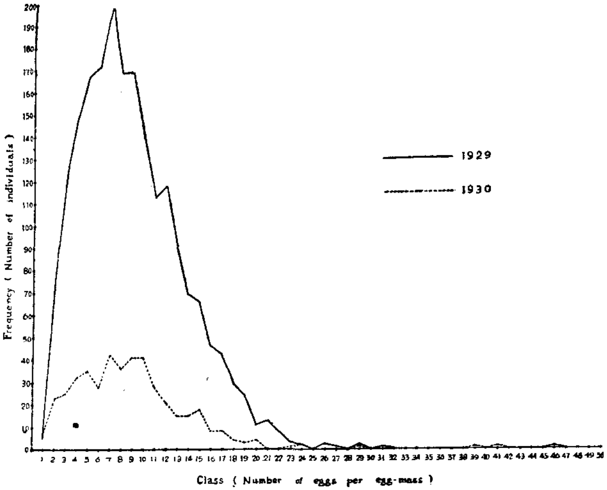


Chart VII

Curve showing frequency of the number of eggs per egg-mass

4. On the Larva

Hatching and Habits of the Newly Hatched Larva Hatching is accomplished by the young larva by means of cutting a longitudinal slit towards the narrow end of the egg and crawls forth. It is quite probable that the young larva does not eat the egg-shell, while the larva commences immediately to feed on the rice-leaf in the proximal part.

General Habits of Larva [Pl. III-fig. 3] The larva is rather inactive and sluggish in habit. When still young the larva remains with the brothers of the same egg-mass on the leaf oviposited, and feeds on the leaf, marking some minute stripes on it. After feeding for a few days on the first leaf, the larva generally migrates to a leaf higher up the plant. The larva

has the habit of commencing its feeding near the tip and of gradually descending towards the base of the leaf. Contrary to the adult, the larva is more active under wet and cloudy weather, so that a very dry and sunny or windy weather is deteriorating to its life. Really, during the daytime the larva comes down to the lower part of plant and is rather inactive, usually resting on the surface of leaves. It is most active both in the morning and the evening as well as at night, and feeds on the rice-leaves ravenously.

As already observed on the other members of the genus *Lema* by senior students, one of the most remarkable habits of the present larva is to cover the body with excreta. By a peculiar provision the anus projects forwards and upwards. The excreta, mixed with mucous secretion which acts as diluting and spreading agent, flow forwards over the body. The excreta are dark green or sometimes blackish green in colour and are retained on the back by some curved hairs provided over the dorsal region and sides. The shape of the larva covered with the excreta, is nearly globular seen from the upper side and hemispherical from the lateral sides. The surface of the excreta covering the body is smooth, and the texture of those is soft. The larva remains covered with these excreta during the greater part of its active life, only being bare for a short time after each moult and immediately before pupating. When the excreta are removed artificially, the larva soon restores the excreta on the back almost as its original state within a few hours. When the larva covered by the excreta sticks on the rice-leaf, it is often mistaken as a lump of mud. The various Japanese names of this insect "Ine-doro-hamushi", "Doro-oi-mushi", "Doro-mushi", "Doroko", "Dorokatsugi", "Katsugi", "Dorokaburi", "Kurosuke", "Funmushi", "Beromushi", etc. come generally from this curious habit of larva.

Time of Appearance The larva appears usually at the latter part of of June, the earliest date in 1930 in the vicinity of Sapporo being June 20, and accelerates in hatching during July. The maximum appearance is usually reached at the beginning of July; and at this time some of the full-grown larvae begin to pupate. The appearance of larva is kept up to a certain extent, till the beginning of August, and ceases entirely at the middle of the said month.

Moulting, Growth and Length of Larval Stage Since it varies considerably according to temperature, humidity, food-plants, and some other conditions, it is not definitely known how long it takes for the larval stage, but some observations show that it takes about from thirteen to nineteen

days under natural conditions. For instance, under my breeding experiments in 1930, the larva hatched on June 20 reached its full-growth and pupated on July 9, comprising nineteen days for larval stage prior to the formation of cocoon. During its growth, as in the case of other insects, the larva has several ecdyses. According to my observations as well as the measurements of the width of head-capsules, there are invariably three moults making four instars. The width of head and body-length in the four instars measured by me are tabulated in the following table:

Table XIX—*Measurements of the width of head and the body-length in the four larval instars*

Item / Instar / Measurement in mm.	The width of head				Body-length			
	I	II	III	IV	I	II	III	IV
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Averzge	0.342	0.487	0.670	0.862	1.14	1.89	2.45	4.73
Maximum	0.368	0.528	0.720	0.896	1.25	2.30	3.60	6.40
Minimum	0.312	0.448	0.608	0.824	1.00	1.25	1.80	3.20
Range	0.056	0.080	0.112	0.072	0.25	1.05	1.80	3.20

Note: Numbers of individuals examined are 15 in the first instar, 12 in the second instar, 20 in each the third and fourth instars.

According to these data, the average width of the head of the fourth instar or full-grown stadium is about 2.5 times of that of the first instar or newly hatched stadium, while the average body-length of the fourth instar is about 4.2 times of that of the first instar. However, since the number of individuals in each instar examined is not sufficient, the biometrical consideration on the larval growth is reserved for some future occasion.

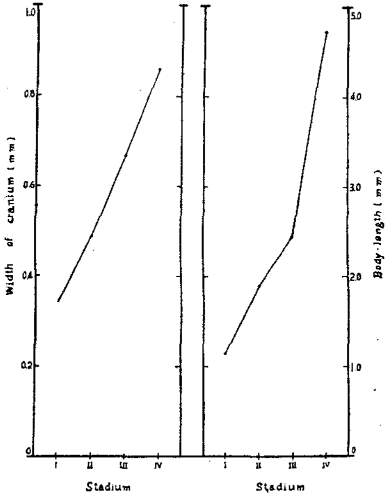


Chart VIII

Growth-curves in the cranium-width and the body-length of larva

5. On the Pupa

Formation of Cocoon and Pupation On becoming fully fed in the fourth instar, the larva slough off the excreta. The larva crawls about on the surface of the leaves for a while, and if a suitable place is found it begins to form the cocoon. Sometimes the larva crawls down the plant, especially in the case of upland rice-field, and forms the cocoon on the surface of the ground [see Pl. IV-fig. 2], and occasionally enters into the soil and pupates under the ground. On the formation of cocoon, the full-grown larva secretes a white, foamy mucous substance throughout the mouth, which may be the secretion of salivary gland. Since the secretion hardens rapidly by the exposure to air, a whitish ellipsoidal cocoon is formed when the secretion covers wholly over the larva. Even in the case of the formation of cocoon on or under the ground, the cocoon is not always constructed with sand, though some particles of soil are at-

tached on the surface of cocoon [see Pl. IV-fig. 3]. *My observations upon* the formation of cocoon of *Lema oryzae* are quite different from those of W. E. H. HODSON (*47*) in the case of *L. melanopa*, but bear a striking resemblance to those of S. HÄNSEL (*46*) in the case of *L. cyanella.*

When the formation of cocoon is completed, the larva enters the quiescent prepupal stage for a few days, and then the prepupa sheds the skin and changes into a yellowish pupa in the cocoon. The pupa invariably faces to the leaf by its ventral side.

Duration of Pupal Stage The length of exact pupal stage is not fully known. However, according to my field observations, the pupal stage lasts from ten days to two weeks, including prepupal stage. Four examples which formed the cocoon on July 9, 1930, were observed to emerge equally on July 22, giving a total life in the cocoon of 13 days.

Location of Cocoon [Pl. III-fig. 4; Pl. IV-fig 2] As stated in the preceding pages, this beetle pupates usually on the rice-leaves, while it pupates also on the surface of ground or under the ground. The latter frequently occurs in the case of upland rice-field. However, I observed in 1930 at Teine, Sapporo district, Province of Ishikari, that some of the full-grown larvae have entered into the soil of the foot-path of ordinary rice-field, constructing a white cocoon under the ground.

In breeding apparatus, covered by the cylinder of wire-screen, during the month of July, 1930, I tried many experiments in order to find out the location of cocoon in the case of upland rice-field. I began to rear thirty nearly full-grown larvae in each apparatus on July 5 and examined them at the end of that month. The results were as follows:

Table XX—*Location of cocoon in the case of upland rice-field.*

Apparatus No.	Number of cocoon				
	On the leaves	On the wire-screen	On the surface of ground	Under the ground	Total
I	4	—	14	4	22
II	5	—	10	6	21
III	9	—	10	3	22
IV	10	—	9	5	24
V	11	—	8	4	23

Apparatus No.	Number of cocoon				
	On the leaves	On the wire-screen	On the surface of ground	Under the ground	Total
VI	1	1	17	9	28
VII	9	—	6	1	16
VIII	8	—	14	4	26
Total	57	1	88	36	182
Percentage	31.3	0.6	48.3	19.8	100.0

From the result of this experiment, in the case of upland rice-field, about a half of the total individuals formed the cocoon on the surface of ground, while about one-third of them formed it on the leaves. In order to find out the depth of its interment when it is formed under the ground, I carefully hunted out the cocoon in the soil of above mentioned breeding apparatus. The results are tabulated below:

Table XXI—*Depth of cocoon in the soil*

Position / Number	Less than 3 cm.	Less than 6 cm.	Less than 9 cm.	Less than 12 cm.	Total
Number examined	34	1	1	0	36
Percentage of ditto	94.4	2.8	2.8	0	100.0

As is seen in the above table, the majority of the cocoons in the soil domicile at the depth less than 3 cm.

It is well known, however, that in the ordinary rice-field most of the cocoons are formed on the leaves, probably due to the irrigation-water on the ground. In this case, the greater part of the cocoons domicile on the upper surface of the leaves [see Pl. III-fig 4]. For an ex..mple, according to my examination on the material presented by the Toyama Agricultural Experiment Station, the number of the cocoons on the upper surface of the leaves was twenty-five and one on the under, the percentage of them being

96.2 and 3.8 respectively. The cocoons on the leaves are singly formed in general, but occasionally two cocoons are attached end by end; the actual numbers were twenty-two in the former case and two in the latter, these being 84.6 per cent and 15.4 per cent respectively.

6. Feeding Habits and Food-Plants

Feeding Habits [Pl. IV-fig. 1] Both the adult and larva feed by gnawing out many longitudinal stripes from the rice-leaves. The marks by their feeding are quite similar, but the marks by the former are rather narrower and shorter than those by the latter [see Pl. III-figs 1 & 3]. The resultant injury is almost indistinguishable from the injuries caused by the adult of the rice leaf-miner (*Oscinis oryzella* MATSUMURA), the very young larva of the rice leaf-caterpillar (*Naranga aenescens* MOORE), the adult of the rice armoured beetle (*Hispa armigera* OLIVIER), etc. The feeding is effected by the removal of parallel longitudinal stripes, leaving the sclerenchyma around the vascular bundle from the leaves, the epidermis of the lower surface being left intact. Really, it is unusual to find the adult or larva feeding on the lower surface. The reason that the feeding is restricted on the upper surface is probably due, as explained by S. HÄNSEL (*46*) in the case of *L. cyanella*, to the fact that the cell of the upper epidermis is larger and has a thinner membrane than that of the lower epidermis. When ravenously fed, the leaves are partly skeletonized and splitted lengthways. The marks of feeding are whitish at first, gradually changing to dull yellow or brownish, and then that part withers.

Food-Plants As far as I am aware of, the rice-plant (*Oryza sativa*) is only a representative as the staple food-plant, or the principal host-plant, not only on my field observations but also based on many previous records of this beetle. However, I observed that the reappeared beetle in spring occasionally finds some nutriment in certain Gramineous plants, such as "Kita-yoshi" (*Phragmites communis*), Orchard grass (*Dactylis glomerata*), Timothy (*Phleum pratense*), etc., especially during the period when the rice-plant has not yet grown. In regard to these temporary food-plants, the Akita, Ishikawa and Yamaguchi Agricultural Experiment Stations and also the Department of Agriculture, Government Research Institute of Formosa have kindly communicated to our Agricultural Experiment Station by our request. These plants are listed in the following lines:

In Akita and Ishikawa Prefectures (Provs. of Ugo & Kaga)

Zizania latifolia ("Makomo")
In Yamaguchi Prefecture (Prov. of Nagato)
Imperata cylindrica var. *Koenigii* ("Chigaya")
In Taiwan (Formosa)
Panicum proliferum ("Ônukakibi")
Ischaemum rugosum var. *segetum* ("Taiwan-aiashi")
Isachne globosa ("Chigo-zasa")
Rottboellia compressa var. *genuina* ("Kobano-ushinoshippei")
Leersia hexandra ("Taiwan-ashikaki")

These are, however, regarded only on the adult-beetle, and no such food-plants are known to the larva.

Experiments on the Food-Plant Selection If our leaf-beetle is really *Lema melanopa*, it should be reared satisfactorily on barley, oats, wheat, Orchard grass, Timothy, etc., which are known as its favourite food-plants in Europe. Nevertheless, though these crops are cultivated extensively in Hokkaido they have heretofore received no damage whatever in the field by our beetle. To solve these problems many experiments were conducted during the months of June and July in 1930 on the rice-plant (*Oryza sativa*), oats (*Avena sativa*), barley (*Hordeum sativum* var. *hexastichon*), naked barley (*Hordeum sativum* var. *vulgare* f. *coeleste*), wheat (*Triticum sativum* var. *vulgare*), rye (*Secale cereale*), Orchard grass (*Dactylis glomerata*) and Timothy (*Phleum pratense*).

A. On the adult The glass-cylinders were used as the breeding-apparatus, and in each of which a pair of the beetle were placed. The results obtained are as follows:

Table XXII—*Experiment No. 1 (Food-plant selection of the adult)*

Apparatus No.	Food-plant	Variety of food-plant	Begin-ning date of rearing	Height of plant at beginning	Conditions on June 18: Total number of plants	Conditions on June 18: Total number of leaves	Conditions on June 18: Number of infested leaves	Conditions on June 18: Percen-tage of infesta-tion	Conditions on June 30: Total number of plants	Conditions on June 30: Total number of leaves	Conditions on June 30: Number of infested leaves	Conditions on June 30: Percen-tage of infesta-tion	Conditions on June 30: life or death of adult ♂	Conditions on June 30: life or death of adult ♀	Total number of eggs deposited
								%				%			
1	Rice	Bodzu No. 5	10/VI	Ca 25 cm.	24	94	54	57.4	24	94	74	78.7	+	±	32
2	”	”	”	”	23	94	41	43.6	23	94	67	71.3	+	+	78
3	”	”	”	”	16	64	34	53.1	16	64	60	93.8	+	+	35
4	”	”	”	Ca 10 cm.	16	40	19	47.5	16	40	40	100.0	+	+	37
5	”	”	”	”	16	42	23	54.8	16	42	42	100.0	+	—	62
6	”	”	”	”	14	30	17	56.7	14	30	30	100.0	+	+	11
7	”	”	”	”	10	22	15	68.2	10	22	22	100.0	—	—	23
8	”	”	”	”	16	40	24	60.0	16	40	40	100.0	+	+	48
Average (or Total)					(135)	(426)	(227)	53.3	(135)	(426)	(375)	88.0			40.8
11	Oats	Victory No. 1	10/VI	Ca 20 cm.	6	24	2	8.3	6	24	4	16.7	—	—	2
12	”	”	”	”	7	31	1	3.2	7	31	2	6.5	+	+	0
13	”	”	”	”	7	28	0	0	7	28	1	3.6	+	+	0
Average (or Total)					(20)	(83)	(3)	3.6	(20)	(83)	(7)	8.4			0.7
14	Orchard grass	—	10/VI	Ca 15 cm.	25	97	0	0	43	135	4	3.0	—	±	0
15	Timothy	—	10/VI	Ca 11 cm.	25	97	0	0	45	150	12	8.0	+	—	0

Note; The mark "+" means living, "—" being dead and "±" flying away.

Table XXIII—*Experiment No. 2 (Food-plant selection of the adult)*

Apparatus No.	Food-plant	Variety of food-plant	Beginning date of rearing	Conditions on June 22				Conditions on July 1					Total number of eggs deposited
				Total number of plants	Total number of leaves	Number of infested leaves	Percentage of infestation	Total number of plants	Total number of leaves	Number of infested leaves	Percentage of infestation	life or death of adult (♂ ♀)	
16	Barley	Sapporo Rokkaku	18/VI	9	19	2	% 10.5	9	20	6	% 30.0	— +	2
17	Naked barley	Marumi No. 16	"	9	21	0	0	9	21	0	0	— ±	1[1]
18	Wheat	Sapporo Haru-komugi No. 9	"	7	14	5	35.7	7	14	8	57.1	— —	5[2]
19	Rye	Old variety	"	9	22	5	22.7	9	22	6	27.3	— ±	5
20	Oats	Victory No. 1	"	8	16	0	0	8	16	0	0	— —	15[2]

Note: 1) Besides the deposition on the plants, five eggs were deposited on the interior surface of a glass-cylinder and four eggs on the Victoria lawn.

2) Greater parts of eggs deposited were hatched during the experiments, but no injuries by the larva to the crops were observed.

From the data obtained, the following several points are concluded in regard to the feeding habits of adult.

1. The rice-plant is the only and most favourite food-plant for this leaf-beetle among the cereals and grasses cultivated in Hokkaido.

2. When the adult-beetle is prevented to feed the rice-leaves, it has a habit to find some nutriment in any cereals or grasses.

In this case, however, the feeding is very slow, consequently the percentage of infestation is low compared to that of the rice-plant.

3. When the adult-beetle can not take the nutriment from the rice-plant, its capacity of oviposition reduces very much.

4. The adult has a tendency to shorten its life when the adult can not get the food from the rice-leaves.

By the use of glass-cylinder apparatus as in the foregoing experiments, during July 1 and 24 inclusive in 1930, I tried the following experiment to see the behaviour of the feeding habits and oviposition-capacity.

Table XXIV—*Experiment No. 3 (Interchange of food-plants experimented with the adult)*

Apparatus No.	Previous food-plant	Food-plant adopted in the experiment	Conditions on July 4					Conditions on July 8					Conditions on July 24				
			Feeding	Condition of adult ♂	Condition of adult ♀	oviposition	condition of larva	Feeding	Condition of adult ♂	Condition of adult ♀	Oviposition	Condition of larva	Feeding	Condition of adult ♂	Condition of adult ♀	Oviposition	Condition of larva
1	Rice	Rice	+	+	+	+	Early deposited eggs have hatched. Larvae feed the leaves extensively.	+	+	+	+	Larvae infest the leaves severely.	—	—	—	—	Some of the full-grown larvae have already formed cocoons.
16	Barley	Barley	+	—	+	—		+	—	—	—						
21	Oats (12)	Oats	—	—	+	—		—	—	—	—						
22	Oats (13)	Rice	+	+	+	+ (15 eggs)		+	+	+	+ (47 eggs)		+	+	±	—	
23	Rice (8)	Wheat	+	+	+	—		+	—	+	—		—	—	—	—	
24	Rice (6)	Timothy	+	+	+	—		+	+	+	—		—	—	—	—	
25	Rice (4)	Barley	+	+	+	—		+	+	+	—		+	+	—	—	

Note: 1) Number in the column of previous food-plant is corresponded with the apparatus-number in the Table XXII.

2) Marks in the column of the condition of adult have the same meaning with those in the Tables XXII and XXIII. Mark "+" in the feeding of adult and oviposition means that the feeding and oviposition are observed, and mark "—" means the contrary.

3) The female in the Apparatus No. 22 deposited sixty-two eggs during the life.

In this experiment we may recognize the following points:

1. If the rice-plant is substituted with the other Gramineous plant, the appetite of the adult diminishes, consequently the capacity of oviposition reduces remarkably, also the life of adult is shortened.

2. On the contrary, when the cereal unsuitable for the food-plant is substituted with the rice-plant, the beetle increases its appetite and prolongs its life, so the capacity of oviposition is recovered.

3. The longer the duration to take the nutriment by the adult in an unsuitable plant the more the life of adult is shortened.

B. On the larva The breeding-apparatus used was a wire-screen cylinder, and each contains 10 larvae of various stadia. The results are tabulated as follows:

Table XXV—*Experiment No. 4 (Food-plant selection of the larva)*

Apparatus No.	Food-plant	Variety of food-plant	Beginning date of rearing	After 1 day (6/VII)		After 2 days (7/VII)		After 3 days (8/VII)		After 5 days (10/VII)		Remarks
				Feeding	Condition of larva	Feeding	Condition of larva	Feeding	Condition of larva	Feeding	Condition of larva	
26	Rice	Bodzu No. 5	5/VII	+	+	++	+	++ Some of the leaves were skeletonized	+	++	+ Some of the larvae pupated	Six cocoons were formed. Five adults emerged.
27	Barley	Sapporo Rokkaku	"	—	+	±	+	±	± Only two larvae remain in waste	—	—	
28	Naked barley	Marumi No. 16	"	—	+	—	+	—	—	—	—	
29	Wheat	Sapporo Haru-komugi No. 9	"	—	+	—	+	±	± Larvae grown very weak	—	—	
30	Rye	Old variety	"	—	+	—	+	±	—	—	—	
31	Oats	Victory No. 1	"	—	+	—	+	—	—	—	—	
32	Timothy	—	"	—	+	±	+	±	± Larvae grown very weak	—	—	
33	Orchard grass	—	"	—	+	—	+	±	—	—	—	

Note: 1) Meaning of marks in the column of feeding is as follows:
++ Fed ravenously, the leaves being partly skeletonized.
+ Fed freely.
± Only a trace of feeding on one or two leaves.
— No feeding at all.
2) Meaning of marks in the column of the condition of larva are as follows:
+ Healthy.
± Some of the larvae died, the remainings being in waste.
— Died.

As is seen in the above table, when the larva was reared on the cereals or grasses other than the rice-plant, it became very weak within three days, sloughing the excreta on the back, and could not feed at all or at best effected only a few traces of feedings on the leaves, and in from three to five days almost of all larvae died.

According to the repeated experiments mentioned above, this insect can live only on the rice-plant, and apparently there are no other substitute food-plant at present. In regard to this phase, the present insect has a different habit from *L. melanopa*.

7. Destructiveness and Economic Aspects

As stated before, this insect, during both its adult and larval stages, does a harm to the rice-plant by gnawing out longitudinal stripes from the leaves. In severely infested case, a stretch of the infested rice-field loses a lively green colour and presents the appearance as if burned by fire as far as the eye could see. In such an occasion it is not rare that one rice-plant contains several dozens of the larvae and adults. The plant severely infested, of course, can not escape death. Although in the case of slight infestation the plant must repeatedly spear new leaves and consequently it is unavoidable to delay its growth. This influence is recognizable more conspicuously in the northern parts in which the duration of the growth of rice-plant is shortened. From the month of August onward, even though the plants were infested in spring, they come to luxuriate the leaves and appear as if recovering their vitality. Nevertheless, if the rice-plants are once affected by this leaf-beetle, they can not avoid the reduction of weight and yield as well as the fall of the value of grains on account of the delay of ripening period.

However, an exact estimation of the damage is impossible, since it varies according to localities where the climatic and many other conditions differ; it is not also constant from year to year even in the same

locality. J. OKADA *(69)* stated that there is from 5 to 20 per cent damage yearly to the rice-crop at the Abu district in Yamaguchi Prefecture. J. MURATA and others *(61)* stated on the conditions in Nagano Prefecture that the yields on the infested rice-fields are 1.5 Koku[1] and 1.4 Koku per Tan[2] each at Kashiwabara in the Kamiminochi district and Taira in the Kita-adzumi district against 2.1 Koku and 1.9 Koku on the healthy rice-fields in the same localities respectively. According to his many experiments conducted in Shimane Prefecture, R. NODZU *(67)* stated that, in 1923 the controlled sections produced an increase of 0.64 Koku per Tan on the average yield against the uncontrolled section, and also in 1925 the controlled sections in two series produced each an increase of 0.536 and 0.2163 Koku against the uncontrolled ones. Now, in Hokkaido, the Hokkaido-Government investigated the rate of damage thoroughly in 1929 on some infested localities in the Province of Ishikari, and attended the result that on the average the yield of controlled field was 2.256 Koku per Tan against to 1.750 Koku of the uncontrolled one. That is, the damage in this case amounts over 22.4 per cent of the whole harvest. Speaking generally, the damages in the infested localities by this pest amount to 5 per cent to 10 per cent of the whole harvest where the infestation is slight, and 20 per cent to 30 per cent where the infestation is severe.

VI. TAXONOMIC CONSIDERATION

1. Systematic Description of the Adult

Lema oryzae KUWAYAMA (1931)

Lema oryzae KUWAYAMA, Kontyû, III, p. 193 (1929) (nom. nudum); KUWAYAMA, Ins. Matsum., V, p. 155 (1931).

Lema melanopa (nec. LINNÉ), SONAN, Taiwan-Nôji-hô, 236, p. 578 (1926); YUASA, Kontyû, I, p. 95 (1926); YUASA, Kontyû, II, p. 61 (1927); MURATA, T., Beibaku. Gaichû. Yobôkujo, p. 343 (1927); MURATA, J. & SEKIYA, Byôchû. Zasshi, XV, p. 146 (1928); TAKAHASHI, Sakumotsu Gaichû Ron, p. 143 (1928); SONAN, Trans. Nat. Hist. Soc. Formosa, XIX, p. 66 (1929); YUASA, Kontyû, III, p. 199 (1929); MATSUMURA, Nô-Konchûgaku, p. 337 (1930).

Lema melanopus (nec LINNÉ) KUWAYAMA, Hokkaido Agr. Exp. Sta., Bul. 47, p. 54 (1928).

Lema tristis (nec HERBST), MATSUMURA, Dainippon Gaichû Zensho, II, p. 121 (1915); MATSUMURA, Konchû Bunruigaku, II, p. 74 (1915); SASAKI, Komaba. Sakumotsu Gaichûhen, p. 82 (1919); MURATA, J. & IKEDA, Byochû. Zasshi, XIII, p. 9 (1926).

Lema flavipes (nec SUFFRIAN) MATSUMURA, Gaichû Kujo Zensho, p. 262 (1897); MATSUMURA, Nippon Konchûgaku, p. 186 (1898); MATSUMURA, Nippon Gaichûhen, p. 283 (1899); ISHI-

1) 1 Koku = 180.4 litres.
2) 1 Tan = 991.7 square meters.

KAWA, Nôgyô Dôbutsu., p. 220 (1906); MATSUMURA, Thous. Ins. Jap., IV, p. 33 (1907); HORI & SHIRAKI, Agr. Exp. Sta., Formosa, Sp. Rep. I, p. 206 (1910); SHIRAKI, Cat. Ins. Nox. Formos., p. 59 (1911); NAWA, Ins. World, XVII, p. 18 (1913); OKADA, Yamaguchi Agr. Exp. Sta., Sp. Rep. III, p. 1 (1913); SHIRAKI, Agr. Exp. Sta., Formosa, Sp. Rep. VIII, p. 597 (1913); NAWA, Ins. World, XVIII, p. 152 (1914); MURATA, T., Beibaku. Gaichû. Yobôkujo, p. 209 (1915); TAKAHASHI, Futûsakumotsu. Gaichû, p. 157 (1916); TAKAHASHI, Nôgyô Konchû., p. 162 (1923); SHIMOYAMA, Shimane Agr. Exp. Sta., Sp. Rep. 32, p. 134 (1926); YOKOYAMA, Fig. Jap. Best., p. 779 (1927).

Lema flavicеps (nec SUFFRIAN) SASAKI, Nippon Nôsaku. Gaichû., p. 113 (1899); TANAKA, Tor., Niigata Agr. Exp. Sta., Month. Rep. 23, p. 53 (1901); ONUKI, Jitsuyô Konchû., p. 136 (1903); KUWANA, Nôyô Konchû. Kôgi, p. 178 (1918); TANAKA, Tom., Tochigi Agr. Exp. Sta., Sp. Rep. IV, p. 125 (1924); MACHIDA & AOYAMA, Chosen Gaichû., p. 86 (1928); NAKAYAMA, Ann. Agr. Exp. Sta., Gov.-Gen. Chosen, IV, p. 264 (1929).

Diagnosis: ♂ ♀. Body oblong, somewhat depressed, subparallel-sided, rounded at the apex, narrowed in front. General colour blackish, with the prothorax bright yellowish brown to reddish brown and the elytra cyaneous or metallic deep blue; eyes black; antennae black, with grayish yellow pubescence densely, excepting two basal joints which are dark brown and scarcely pubescent; scutellum black; legs bright brownish yellow, with blackish coxae and dark brownish tarsi, the tibia being darkened at the apex; the abdominal sternites somewhat darker than the upper side, and with dense grayish yellow pubescence.

Head as wide as the prothorax, punctured roughly, and bearing a few yellowish white pubescence on the face. Eyes prominent, raised hemispherically. Antenna shorter than the length of elytron, but longer than the length of the head and pronotum taken together; first segment large and grobular, the second small, the third somewhat longer than the second, the fifth and terminal the longest, followed by the sixth to the tenth; from the proximal flagellum to the tenth gradually broadened, eleventh bluntly pointed. Prothorax as long as wide, slightly narrowed anteriorly and posteriorly, transversely sulcate at the base, polish and roughly punctate. Scutellum small, subtrigonate, and with moderate coarse punctures and pubescence. Elytra elongate, at the base much broader than the prothorax, strongly punctate-striate, the striae of each represented by eleven rows, the shoulders well marked, and slightly depressed from about the middle to the base. Legs similar in three pairs, rather long; femora incrassate, but as long as the tibia; covered all over with dense pubescence. Underside with close and fine punctures, and covered with fine pubescence.

Measurements: Average length of body 4.23 mm. in the male and 4.76 mm. in the female.

Remarks: Described from 27 male and 25 female specimens. The

cotypes are deposited now with the collection of the Hokkaido Agricultural Experiment Station.

In form and colouration this species closely resembles *Lema melanopa* LINNÉ, and hitherto wrongly identified as the latter species. However, it entirely differs in the colourations of the basal two joints of antennae, the venter of abdomen, trochanter, tarsi and the apices of tibiae, and also the condition of punctures and pubescence on the abdominal sternites The shape and colour of the male genitalia, or penis, are also quite different in both species. These differences are discussed in detail in a later chapter.

2. Comparison of the Adult with the Other *Lema*-Species in Japan

(1) Synopsis of the Japanese Species of *Lema*

Family **Chrysomelidae** LEACH (1819)

[Division **Eupodes** CHAPUIS (1874)]

Subfamily **Criocerinae** LACORDAIRE (1845)

Genus ***Lema*** FABRICIUS (1798)

Lema FABRICIUS, Ent. Syst. Suppl., p. 90 (1798); LACORDAIRE, Mém. Soc. Roy. Sci. Liège, III- 1, p. 303 (1845); CHAPUIS, Gen. Col., X, p. 72 (1874); WEISE, Naturg. Ins. Deutsch., I Abt., VI, p. 59 (1881); FOWLER, Col. Brit. Isl., IV, p. 281 (1890); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 5 (1904); JACOBY, Fauna Brit. Ind., Col. II, Chrys. I, p. 15 (1908); REITTER, Fauna Germ., IV, p. 81 (1912); CLAVAREAU, Col. Cat., LI, p. 52 (1913); KUHNT, Illust. Best.-Tab. Käfer Deutsch., p. 817 (1913); SCHAUFUSS, Calw. Käferb., II, p. 901 (1916).

Of the genus *Lema* of Japan, from Karafuto in the north to Taiwan in the south, including Chosen, more than twenty species have hitherto been described. However, my careful examination of the material at hand reveals not only some reduction of the number of species on account of synonyms, but also one species and three varieties new to science; and we can enumerate nineteen species and three varieties at present in our faunal region. I wish to make use of this occasion to tabulate and describe them in the following pages. The material used is of three collections in the Entomological Museum, Faculty of Agriculture, Hokkaido Imperial University, in the Entomological Laboratory, Department of Agriculture, Kyushu Imperial University and in the Hokkaido Agricultural Experiment Station.

1. *Lema puncticollis* CURTIS

Crioceris puncticollis CURTIS, Brit. Ent., VII, Pl. 323 (1830).

Lema puncticollis BALY, Trans. Ent. Soc. Lond., 1873, p. 74 (1873); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., p. 752 (1885); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 6 (1904); REITTER, Fauna Germ., IV, p. 81 (1912); KUHNT, Illust. Best.-Tab. Käfer Deutsch., p. 817 (1913); SCHAUFUSS, Calw. Käferb., II, p. 903 (1916).

Lema cyanella (nec LINNÉ) WEISE, Naturg. Ins. Deutsch., I Abt., VI, p. 61 (1881); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 174 (1887); FOWLER, Col. Brit. Isl., IV, p. 281 (1890); CLAVAREAU, Col. Cat., LI, p. 60 (1913); WINKLER, Cat. Col. reg. Palaearc., X, e. 1231 (1929).

Lema rugicollis SUFFRIAN, Stett. Ent. Zeit., A. 1841, p. 97 (1841); LACORDAIRE, Mém. Soc. Roy. Sci. Liége, III-1, p. 362 (1845).

Local Distribution: Sapporo (June 12, 1916, May 31, 1918, leg. S. MATSUMURA), Atsubetsu, Prov. Ishikari (May 28, leg. S. MATSUMURA), Iwate, Prov. Rikuchû (September 8, 1912, leg. T. OGASAWARA), Chûzenji, Prov. Shimotsuke (June 3–6, 1911, leg. S. MATSUMURA; July 21–31, 1914, July 8–17, 1916, September 25, 1916, leg. E. GALLOIS), Tokyo (July, 1903, leg. S. MATSUMURA), Chichibu, Prov. Musashi (June 10, 1913, leg. H. TAKABAYASHI), Mt. Takao, Prov. Musashi (May 6, 1912, leg. H. TAKABAYASHI; May 18, 1913, leg. E. GALLOIS), Kôyadaira, Prov. Awa (August 4–6, 1913, leg. E. GALLOIS), Nagasaki (July 8, 1913, leg. S. MATSUMURA) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Nagasaki (after J. S. BALY).

General Distribution: Hokkaido, Honshu, Shikoku, Kyushu; Mongolia; Europe.

Japanese Name: Ruri-kubiboso-hamushi.

Remarks: This species does not seem to be very rare from Hokkaido to Kyushu. J. S. BALY (3) first recorded this species from our faunal region on a single specimen taken by G. LEWIS at Nagasaki.

2. *Lema cyanella sapporensis* MATSUMURA

Lema sapporensis MATSUMURA, Jour. Coll. Agr., Tohoku Imp. Univ., IV, p. 140 (1911) YOKOYAMA & KANO, Dôbutsu. Zasshi, XXXIX, p. 24 (1927).

Lema pygmaea (KRAATZ in part) WINKLER, Cat. Col. reg. Palaearc., X, e. 1231 (1929).

Local Distribution: Ôdomari, Karafuto (June 30, 1919, leg. E. IZAWA) [in the collection of the Hokkaido Agr. Exp. Sta.]; Toyohara, Karafuto (August 24, 1914, leg. J. ADACHI & S. ISSIKI), Sapporo (May 16, 1904, leg. S. MATSUMURA), Jôzankei, Prov. Ishikari (July 12, leg. S. MATSUMURA) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Tonnaitcha (after S. MATSUMURA).

General Distribution: Karafuto, Hokkaido.

Japanese Name: Hime-ruri-kubiboso-hamushi.

Remarks: S. MATSUMURA (*25*) in his original description states that *L. sapporensis* may be distinguished from *L. cyanella* by the character of the punctures on the pronotum and the size. A. WINKLER (*39*) treated recently this species as a synonym of *L. pygmaea*, which was originally described from the Amur. Nevertheless, in examining the specimens of *L. cyanella* taken in Finkenkrug near Berlin and Göttingen, Germany, by T. ESAKI, and the type specimens of *L. sapporensis*, I have come to conclusion that the difference between the two forms can not be adopt as a specific character, while *L. sapporensis* should be taken for a local form, or subspecies, of *L. cyanella*. The typical *L. cyanella* is distributed in Europe and Siberia. In the collection of the Hokkaido Agricultural Experiment Station, I found one more specimen taken at Konuma, Karafuto, in July, 1930, by K. TAMANUKI. It is entirely blackish in colour dorsad, while the other characters agree with this species. I presume that it is a melanic aberration to be referred to ab. *obscura* STEPHENS, well known as a common form in Europe.

3a. *Lema concinnipennis* BALY

Lema concinnipennis BALY, Ann. Mag. Nat. Hist., (3), XVI, p. 157 (1865); BALY, Trans. Ent. Soc. Lond., 1873, p. 70 (1873); GEMMINGER & HAROLD, Cat. Col., XI, p. 3252 (1874); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 752 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 174 (1887); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 6 (1904); CLAVAREAU, Col. Cat., LI, p. 59 (1913); DOI, Dôbutsu. Zasshi, XXXIX, p. 326 (1927); WINKLER, Cat. Col. reg. Palaearc., X, e. 1232 (1929).

Lema Kiotoensis PIC, Mél. Exot. Ent., XLI, p. 12 (1924).

Local Distribution: Kyoto (July 5, 1913, leg. S. HIRAYAMA), Kôyadaira, Prov. Awa (August 4-6, 1913, leg. E. GALLOIS), Keijô (June 8, 1919, leg. E. GALLOIS), Taiyudong, Chosen (leg. E. GALLOIS), Tojinmen, Chosên (leg. K. DOI) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Mt. Kibune, Prov. Yamashiro (June 25, 1919, leg. M. SUZUKI), Fukuoka (April 23, 1929, leg. T. MATSUO) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]; Hyôgo, Prov. Settsu (after J. S. BALY); Nagasaki (after J. S. BALY).

General Distribution: Honshu, Shikoku, Kyushu, Chosen; North China; Turkestan (Coast of Tartary).

Japanese Name: Kibara-kubiboso-hamushi.

Remarks: J. S. BALY (*3*) noted that this species was found on the Chrysanthemum.

3b. *Lema concinnipennis* BALY var. *ventralis* nov. var.

Diagnosis: This varietal form is very similar structurally to the typical

species, but differs in the following respects:

1) Abdominal sternites concolorously blackish.

2) Size rather smaller throughout.

3) Scutellum more or less densely clothed with adpressed sericeous hairs.

Measurements: Length of body 4.5–5.0 mm; width of body 2.0 mm.

Local Distribution: Kôyadaira, Prov. Awa (July 27–August 11, 1913, leg. E. GALLOIS), Chosen (leg. H. OKAMOTO) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]

General Distribution: Shikoku, Chosen.

Japanese Name: Ruribara-kubiboso-hamushi.

Remarks: J. S. BALY *(2)* already recognized a variety, of which abdomen is entirely black, in 1865, when he described from the specimens brought from the North China, and then he *(3)* noted in 1873 that "in the majority of the larger specimens from Japan the abdomen is entirely black; but I possess others, equally large, from the coast of Tartary, in which the apex of the abdomen is testaceous: I presume, therefore, that this is normal colouring, the black apex being only a variety". He gave, however, no name on this variety, and I take this opportunity to adopt new name on this distinct variety.

4. *Lema coronata* BALY

Lema coronata BALY, Trans. Ent. Soc. Lond., 1873, p. 72 (1873); GEMMINGER & HAROLD, Cat. Col., XI, p. 3252 (1874); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 752 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 174 (1887); JACOBY & CLAVAREAU, Gen. Ins. XXIII, p. 6 (1904); CLAVAREAU, Col. Cat., LI, p. 60 (1913); WINKLER, Cat. Col. reg. Paraearc., X, e. 1232 (1929).

Local Distribution: Kumamoto (September 14, 1907, leg. H. KAWAMURA) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Mizoro-Ike, Prov. Yamashiro (June 21, 1918, leg. M. SUZUKI), Fukuoka (June 11, 1929, leg. M. FUJINO) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]; Nagasaki (after J. S. BALY).

General Distribution: Honshu, Kyushu.

Japanese Name: *Akazu-kubiboso-hamushi.*

Remarks: J. S. BALY *(3)* reported that the type specimens of this species were captured on the Chrysanthemum. As far as I am aware of, this is rather a rare species in our faunal region.

5. *Lema dilecta* BALY

Lema dilecta BALY, Trans. Ent. Soc. Lond., 1873, p. 74 (1873); GEMMINGER & HAROLD,

Cat. Col., XI, p. 3253 (1874); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 194 & p. 752 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 174 (1887); CLAVAREAU, Col. Cat., LI, p. 62 (1913); WINKLER, Cat. Col. reg. Palaearc., X, e. 1232 (1929).

Local Distribution: Nakano, Prov. Musashi (July 17, leg. S. MATSUMURA) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Maruyama, Prov. Ishikari (July 29, 1918, leg. M. SUZUKI) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]; Hyôgo, Prov. Settsu (after J. S. BALY); Ogura Lake, Prov. Yamashiro (after M. JACOBY); Kyoto (after M. JACOBY).

General Distribution: Hokkaido, Honshu.

Japanese Name: Maeboshi-kubiboso-hamushi.

Remarks: The specimen at my disposal, caught at Maruyama near Sapporo, has blackish legs, with the exception of fulvous basal halves of tibiae, and dark brownish raised spot at the middle between the upper portion of the eyes, but no other difference could be found. This species seems to be a rare one.

6. *Lema tristis* HERBST

Crioceris tristis HERBST, in Fuessly, Arch. Ins., VII, p. 165 (1786).

Lema tristis WEISE, Arch. f. Naturg., LXVI, p. 267 (1900); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 6 & p. 8 (1904); REITTER, Fauna Germ., IV, p. 81, Pl. 141–fig. 18 (1912); CLAVAREAU, Col. Cat., LI, p. 81 (1913); KUHNT, Illust. Best.-Tab. Käfer Deutsch., p. 817 (1913); SCHAUFUSS, Calw. Käferb., II, p. 903 (1916); YUASA, Kontyû, I, p. 96 (1926); WINKLER, Cat. Col. reg. Palaearc., X, e. 1231 (1929).

Lema flavipes SUFFRIAN, Stett. Ent. Zeit., II, p. 100 (1841); LACORDAIRE, Mém. Soc. Roy. Sci. Liége, III–1, p. 367 (1845); BALY, Trans. Ent. Soc. Lond., p. 75 (1873); GEMMINGER & HAROLD, Cat. Col., XI, p. 3254 (1874); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); WEISE, Naturg. Ins. Deutsch., VI, p. 65 (1882); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 752 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 174 (1887).

Local Distribution: Nagara, Prov. Mino (July 19, 1919, leg. M. SUZUKI) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]; Tokyo (after Hiro. YUASA); Nagasaki (after J. S. BALY); Tsushima (after J. S. BALY).

General Distribution: Honshu, Tsushima, Kyushu; Siberia; Mongolia; South Europe.

Japanese Name: Kiashi-kubiboso-hamushi.

Remarks: In Japan it seems to be a rare species. J. S. BALY *(3)* regarded his Nagasaki and Tsushima specimens as a variety of European form on account of their infuscated tibia and tarsi. Hiro. YUASA *(42)*, however, recorded that the legs of his reared specimen are only darkened on the tarsi, while the Nagara specimen at my disposal has brownish legs,

only darkened at the last tarsal joint. From this I shall have to look upon the specimen having darkened legs as merely a form of individual variation.

7. *Lema melanopa* LINNÉ

Chrysomela melanopa LINNÉ, Syst. Nat., ed. X, 1, p. 376 (1758).

Crioceris melanopa FABRICIUS, Syst. Ent., p. 121 (1775); CURTIS, Farm. Ins., p. 307, Fig. 43 (1883).

Lema melanopa FABRICIUS, Syst. Eleuth., I, p. 476 (1801); SUFFRIAN, Stett. Ent. Zeit., 1841, p. 101 (1841); LACORDAIRE, Mém. Soc. Roy. Sci. Liége, III-1, p. 393 (1845); GEMMINGER & HAROLD, Cat. Col., XI, p. 3257 (1874); WEISE, Naturg. Ins. Deutsch., VI, p. 65 (1882); JACOBY, Proc. Zool. Soc. Lond., 1888, p. 351 (1888); FOWLER, Col. Brit. Isl., IV, p. 282 (1890); LEWIS, Entomologist, XXVI, p. 153 (1893); NAWA, Konchû Sekai, VIII, p. 343 (1904); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 5 & p. 7 (1904); REITTER, Fauna Germ., IV, p. 82, Pl. 142-fig. 1 (1912); CLAVAREAU, Col. Cat., LI, p. 70 (1913); KUHNT, Illust. Best.-Tab. Käfer Deutsch., p. 817 (1913); HODSON, Bul. Ent. Res., XX, p. 5, Pls. I-II (1929); WINKLER, Cat. Col. reg. Palaearc., X, e. 1231 (1929).

Lema melanopus SCHAUFUSS, Calw. Käferb., II, p. 903, Pl. XXXIII-fig. 13 (1916).

Local Distribution: Niigata (after G. LEWIS); Shiojiri-toge, Prov. Shinano (after G. LEWIS); Yoshiki district, Prov. Hida (after NAWA).

General Distribution: Honshu; Siberia; Madeira; North Africa; Europe.

Japanese Name: Kubiaka-kubiboso-hamushi.

Remarks: To supplement his catalogue of the Japanese Phytophaga published in 1885, M. JACOBY *(10)* noted in 1888 that "*Lema melanopa* is left out, the species is, I believe, found in Japan". G. LEWIS *(21)* also says in 1893 in regard to this species—"This Eurasian species is scarce in Japan; I found it at Niigata, and I swept five examples on the Shiwojiri-toge in July, 1881". Unfortunately I have not yet met with any specimen to be determined as *L. melanopa*, and I personally give rein to my imagination that M. JACOBY, G. LEWIS and NAWA might have wrongly identified the rice leaf-beetle, *L. oryzae*, as this species. Anyhow, the occurrence of this species in our faunal region is doubtful.

8. *Lema oryzae* KUWAYAMA

Lema oryzae KUWAYAMA, Ins. Matsum., V, p. 155 (1931).

Local Distribution: Kotoni, Prov. Ishikari (June 10–July 5, 1930, leg. S. KUWAYAMA), Kuroishi, Prov. Mutsu (June 9, 1930, leg. S. ASAHARA), Junisho, Prov. Ugo (May 21, 1930, leg. R. TAKEDA), Yamagata (June 9, 1930, leg. D. TOYOTA), Suyoshi, Prov. Echigo (June 13, 1930, leg. N. TAKAHASHI), Horikawa, Prov. Etchû (July 4, 1930, leg. S. IWAYAMA),

Minma, Prov. Kaga (June 20, 1930, leg. K. KATSUMATA), Kawagishi, Prov. Shinano (leg. T. ASANUMA), Hotaru, Prov. Kai (June 19, 1930, leg. T. KANZAWA), Mt. Kurama, Prov. Yamashiro (July 6, 1915, leg. M. SUZUKI), Tokusa, Prov. Nagato (July 5, 1930, leg. Tokusa Agr. Soc.), Tokusen, Heiannando (July 3, 1930, leg. S. MURAMATSU), Taihoku (April 13, 1930, leg. J. SONAN) [in the collection of the Hokkaido Agr. Exp. Sta.]; Kameda, Prov. Oshima (June 7, 1898, leg. S. MATSUMURA), Kashiwazaki, Prov. Echigo (leg. M. NAKAMURA), Gunma, Prov. Kôzuke (August 7, 1913, leg. S. MATSUMURA), Gifu (leg. Y. NAWA), Taihoku (April, 1915, leg. S. INAMURA; May 8, 1925, leg. R. TAKAHASHI) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Mt. Kurama, Prov. Yamashiro (May 25, 1919, leg. M. SUZUKI); Kotoni, Prov. Ishikari (July 5, 1930, leg. S. KUWAYAMA) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]

General Distribution: Hokkaido, Honshu, Shikoku[1], Kyushu[2], Chosen, Taiwan.

Japanese Name: Ine-(doro)-kubiboso-hamushi.

Remarks: This species has been identified as *L. tristis* HERBST or *L. melanopa* LINNÉ, but it is not right. So far as my studies go, it is an undescribed species, and the above-mentioned name was given in 1931.

9. *Lema honorata* BALY

Lema honorata BALY, Trans. Ent. Soc. Lond., 1873, p. 73 (1873); GEMMINGER & HAROLD, Cat. Col., XI, p. 3255 (1874); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 752 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 175 (1887); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 7 (1904); CLAVAREAU, Col. Cat., LI, p. 66 (1913); TAKAHASHI, Jour. Pl. Protect. (Byôchûgai Zasshi), III, p. 277, 1 fig. (1916); TAKAHASHI, Sosai Gaichû Kakuron, p. 121, Figs. 69–70 (1928); WINKLER, Cat. Col. reg. Palaearc., X, e. 1232 (1929).

Local Distribution: Prov. Hyûga (April 29, 1909, leg. M. KURISAKI) [in the collection of the Hokkaido Agr. Exp. Sta.]; Iwate, Prov. Rikuchû (August 20, 1912, leg. T. OGASAWARA), Morioka (leg. S. MATSUMURA), Tokyo (July, 1903, leg. S. MATSUMURA), Mt. Takao, Prov. Musashi (May 6, 1912, leg. H. TAKABAYASHI), Komaba, Prov. Musashi (July 30, 1913, leg. H. TAKABAYASHI), Shizuoka (August 24, 1912, leg. H. TAKABAYASHI), Mt. Iwawaki, Prov. Kawachi (July 18, 1913, leg. S. ISSIKI), Nara (August 2, 1910, leg. S. MATSUMURA), Prov. Ise (leg. S. MATSUMURA), Mt. Kinkwa,

1) According to the communication from the Tokushima and K gawa Agricultural Experiment Stations.

2) According to the "Surveys on the distribution of diseases and injurious insects. Part II" (Mimeograph), published in 1929 by the Board of Agriculture, Department of Agriculture and Forestry of Japan.

Prov. Mino (June 22, 1910, leg. T. ÔTSUKA), Takasago, Prov. Harima (July, leg. S. MATSUMURA), Hagi, Prov. Nagato (August 9, 1904, leg. S. MATSUMURA), Prov. Iyo (June 4, 1914, leg. S. ARAKAWA), Kôyadaira, Prov. Awa (July 25–August 11, 1913, leg. E. GALLOIS) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Mizoro-Ike, Prov. Yamashiro (June 21, 1918, leg. M. SUZUKI), Wakasugiyama, Prov. Chikuzen (August 26, 1929, leg. T. ESAKI, H. HORI & M. FUJINO), Hikosan, Prov. Buzen (July 17, 1929, leg. T. ESAKI & M. FUJINO) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]; Nagasaki (after J. S. BALY).

General Distribution: Honshu, Shikoku, Kyushu.

Japanese Name: Yamanoimo-kubiboso-hamushi.

Remarks: This species is very common in different localities, and as had already been reported by J. S. BALY (*3*) in 1873, this insect has a habit to feed on *Dioscorea japonica* ("Yamanoimo"). According to S. TAKAHASHI (*35*, *36*), this widely distributed species injures "Yamanoimo", like *Crioceris rugata* BALY, especially in Miye, Niigata, Saitama, Fukui, Ishikawa and Fukushima Prefectures, and produces one generation annually, hibernating in the adult-stage. TAKAHASHI stated also that the adult appears during the months of June and July and deposits her eggs singly on the young leaves or buds of the food-plant; the larva remains coverd with excreta during the greater part of its active life and skeletonizes the under surface of leaves, the cocoon is formed of a white quick hardening secretion on the under surface of leaves.

10. *Lema fortunei* BALY

Lema Fortunei BALY, Trans. Ent. Soc. Lond., (n. s.), V, p. 148 (1859); BALY, Trans. Ent. Soc. Lond., 1873, p. 74 (1873); GEMMINGER & HAROLD, Cat. Col., IX, p. 3254 (1874); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 752 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 175 (1887); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 7 (1904); CLAVAREAU, Col. Cat., LI, p. 64 (1913); WINKLER, Cat. Col. reg. Palaearc., X, e. 1232 (1929).

Lema postrema BATES, Proc. Zool. Soc. Lond., 1866, p. 353 (1866); GEMMINGER & HAROLD, Cat. Col., XI, p. 3259 (1874); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 7 (1904); CLAVAREAU, Col. Cat., LI, p. 74 (1913).

Local Distribution: Shôka, Taiwan (July 20, 1906, leg. S. MATSUMURA) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Nagasaki (after J. S. BALY).

General Distribution: Kyushu, Taiwan; North China.

Japanese Name: Taiwan-kubiboso-hamushi.

Remarks: So far as my investigations go, *L. postrema* BATES could hardly be distinguished from *L. fortunei* BALY, which was described much

earlier than the BATES' species, and so I treated in this paper *L. postrema* as the synonym of *L. fortunei*. In 1873, J. S. BALY (*3*) gave Nagasaki, Kyushu, as a locality of this species. I did not find, however, any specimens from that region.

11. *Lema lewisii* BALY

Lema Lewisii BALY, Trans. Ent. Soc. Lond., 1873, p. 72 (1873); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 752 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 175 (1887).

Lema Lewisi GEMMINGER & HAROLD, Cat. Col., XI, p. 3256 (1874); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 7 (1904); CLAVAREAU, Col. Cat., LI, p. 68 (1913); WINKLER, Cat. Col. reg. Palaearc., X, e. 1232 (1929).

Local Distribution: Prov. Hyûga (May 5, 1909, leg. M. KURISAKI) [in the collection of the Hokkaido Agr. Exp. Sta.]; Tamagawa, Prov. Musashi (May 21, 1914, leg. H. TAKABAYASHI), Mt. Kinugasa, Prov. Yamashiro (August 18, 1913, leg. S. HIRAYAMA), Kôyadaira, Prov. Awa (July 25–August 11, 1913, leg. E. GALLOIS), Prov. Iyo (May 1, 1914, leg. S. ARAKAWA), Kumamoto (April 12, 1907, August 27, 1907, leg. H. KAWAMURA), Beppu, Prov. Hyûga (July 10, 1916, leg. S. MATSUMURA) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Hanazono, Prov. Yamashiro (July 6, 1921, leg. M. SUZUKI), Shimonoseki, Prov. Nagato (August 22, 1930, leg. K. YASUMATSU), Hikosan, Prov. Buzen (August 2, 1930, leg. K. YASUMATSU) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]; Nagasaki (after J. S. BALY).,

General Distribution: Honshu, Shikoku, Kyushu.

Japanese Name: Lewis-kubiboso-hamushi.

Remarks: This species is not rare in the southern parts of Japan.

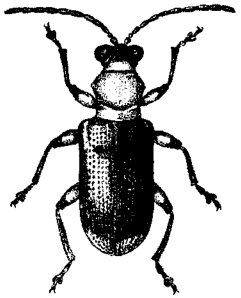
12. *Lema formosana* sp. nov. [Text-fig. II]

Diagnosis: Head metallic dark blue, with the vertex rufous; the lower portion of the face sparingly clothed with yellowish pubescence; eyes blackish; labrum and palpi nearly black; antenna long and slender, entirely black; the third joint one half longer than the second but shorter than the fourth; the fourth, the fifth and the sixth joints being equal; all joints shining, scarcely pubescent. Prothorax rufous and polish; sternites of the meso- and meta-thorax black, with dense yellowish pubescence.

Scutellum brownish black. Elytra metallic deep blue, margined with a flavous colour on the apical portions. Legs nearly black, except the basal halves of femora rufous; abdomen fulvous or flavous.

Head constricted posteriorly, vertex finely punctured and with a short

longitudinal groove in the middle; eyes large, deeply notched, the surrounding space rugose. Prothorax subquadrate, not longer than broad, rather deeply constricted just behind the middle at the sides; basal sulcus deep and sinuate; at the sides minutely and remotely punctured; rest of the surface impunctate. Scutellum broader than long, truncate at the apex, smooth. Elytra parallel-sided, with a distinct sutural depression below the base, regularly and rather deeply punctate-striate; the punctures larger within the depression, much finer and more apart posteriorly, where the interstices are convex. Underside clothed with fine pubescence.



Text-fig. II
Lema formosana sp. nov.
(Ca × 8)

Measurements: Length of body 5.5 mm.; width of body 2.0 mm.

Local Distribution: Taichû, Taiwan (May 4, 1907, leg. S. MATSUMURA) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]

General Distribution: Taiwan.

Japanese Name: Tsumaki-kubiboso-hamushi.

Remarks: The cotypes are three specimens of the same locality and labelled as a pest of sugar-cane. The general appearance of this species is that of *L. lewisii* BALY, but by the colour of abdomen and femora, the character of the vertex and scutellum easily distinguish both species.

13. *Lema delicatula* BALY

Lema delicatula BALY, Trans. Ent. Soc. Lond., 1873, p. 75 (1873); GEMMINGER & HAROLD, Cat. Col., XI, p. 3253 (1874); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 753 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 174 (1887); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 7 (1904); CLAVAREAU, Col. Cat., LI, p. 61 (1913); WINKLER, Cat. Col. reg. Palaearc., X, e. 1232 (1929).

Local Distribution: Gifu (July 14, 1903, leg. Y. NAWA), Kôyadaira, Prov. Awa (August 9, 1913, leg. E. GALLOIS) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Mt. Yatsugatake, Prov. Shinano (August 20, 1918, leg. M. SUZUKI), Hikosan, Prov. Buzen (August 2, 1930, leg. K. YASUMATSU) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]; Nagasaki (after J. S. BALY).

General Distribution: Honshu, Shikoku, Kyushu.

Japanese Name: Kiobi-kubiboso-hamushi.

Remarks: This handsome species is rare but widely distributed in the southern Japan.

14. *Lema scutellaris* KRAATZ

Crioceris scutellaris KRAATZ, Deutsch. Ent. Zeitschr., XXIII, p. 130, Pl. II-fig. 4 (1879); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 28 (1904).

Lema scutellaris JAKOBSON, Rev. Russe d'Ent., VII, p. 26 (1907); CLAVAREAU, Col. Cat., LI, p. 77 (1913); DOI, Dôbutsu. Zasshi, XXXIX, p. 327, 1 fig. (1927); WINKLER, Cat. Col. reg. Palaearc., X, e. 1231 (1929).

Local Distribution: Kotoni, Prov. Ishikari (September 11, 1930, leg. S. KUWAYAMA; September 16, 1931, leg. M. TAKIZAWA) [in the collection of the Hokkaido Agr. Exp. Sta.]; Iwate, Prov. Rikuchû (May 16, 1912, leg. T. OGASAWARA), Mt. Takao, Prov. Musashi (May 24, 1912, leg. S. HIRAYAMA), Chosen (July, 1922, leg. T. UCHIDA & S. TAKANO) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Mizoro-Ike, Prov. Yamashiro (June 21, 1918, leg. M. SUZUKI), Osaka (April 4, 1917, leg. T. ESAKI) [in the collection of the Ent. Lab., Dept., Agr., Kyushu Imp. Univ.]

General Distribution: Hokkaido, Honshu, Chosen; Siberia.

Japanese Name: Seaka-kubiboso-hamushi.

Remarks: This species seems to be rare, but widely distributed in the northern part of Japan as well as in Chosen, the type-locality being in the Amur. This species was newly added to the fauna of Hokkaido in this paper.

15. *Lema adamsii* BALY

Lema Adamsii BALY, Ann. Mag. Nat. Hist., (3), XVI, p. 156 (1865); BALY, Trans. Ent. Soc. Lond., 1873, p. 75 (1873); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 753 (1885).

Lema Adamsi GEMMINGER & HAROLD, Cat. Col., XI, p. 3250 (1874); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 194 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 174 (1887); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 6 (1904); CLAVAREAU, Col. Cat., LI, p. 53 (1913); WINKLER, Cat. Col. reg. Palaearc., X, c. 1232 (1929).

Lema quadripunctata SWARTZ, in Schönh. Syn. Ins., (1), II, p. 281 (1808); LACORDAIRE, Mém. Soc. Roy. Sci. Liége, III-1, p. 544 (1845).

Lema Swartzi CLARK, Cat. Phyt., p. 25 (1866).

Local Distribution: Honshu[1] (June 4, 1908, leg. KOJIMA), Hachijo-jima (August 18, leg. S. MATSUMURA) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Yuyama (after M. JACOBY); Nagasaki

1) Locality is uncertain.

(after J. S. BALY); "Korea" (after H. CLAVAREAU).

General Distribution: Honshu, Kyushu, Chosen; China.

Japanese Name: *Kiberi-kubiboso-hamushi.*

Remarks: As had already been mentioned by J. S. BALY *(3)* and M. JACOBY *(9)*, the colouration, especially the markings on the elytra, of this species varies considerably among the individuals. For instance, one of the two specimens at my disposal has two bluish black spots on each elytron as originally described by J. S. BALY *(2)*, and the other has a bluish black longitudinal broad band, by the connection of the elytral spots, as noted by M. JACOBY *(9)*.

16a. *Lema diversa* BALY

Lema diversa BALY, Trans. Ent. Soc. Lond., 1873, p. 71 (1873); GEMMINGER & HAROLD, Cat. Col., XI, p. 3253 (1874); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 752 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XI, p. 174 (1887); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 7 (1904); CLAVAREAU, Col. Cat., LI, p. 62 (1913); DOI, Dōbutsu. Zasshi, XXXIX, p. 326 (1927); WINKLER, Cat. Col. reg. Palaearc., X, c. 1232 (1929).

Local Distribution: Kyoto (leg. M. SUZUKI; leg. S. HIRAYAMA), Nagasaki (1924, leg. T. ISHII), Genzan (August 2, 1919, leg. E. GALLOIS), Keijo (September 12, 1918, leg. E. GALLOIS), Tojinmen, Chosen (July, leg. K. DOI) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Hanazono, Prov. Yamashiro (June 16, 1921, leg. M. SUZUKI) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]; Nagasaki (after J. S. BALY).

General Distribution: Honshu, Kyushu, Chosen; China.

Japanese Name: Aka-kubiboso-hamushi.

Remarks: J. S. BALY *(3)* reported that this species was captured on the Chrysanthemum at Nagasaki.

16b. *Lema diversa* BALY var. *doii* nov. var. [Text-fig. III]

Diagnosis: Differs from the typical species in the following points:

1) Each elytron with a bluish black longitudinal band along the side. This band sometimes is broadened apically, and covers the distal half of elytron, leaving only the sutural and lateral margins of the ground colour.

2) The sutural depression below the base of elytra is rather shallower than that of the typical species.

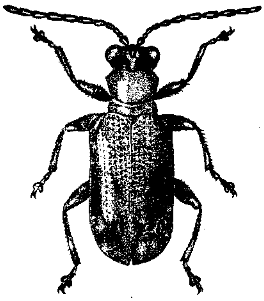
Measurements: Length of body, 5.5 mm., width of body, 2.2 mm.

Local Distribution: Kyoto (leg. S. HIRAYAMA) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]

General Distribution: Honshu.

Japanese Name: Kurosuji-kubi-boso-hamushi.

Remarks: Two specimens of this variety are placed at my disposal. Dedicated this variety to K. DOI who studied the Chrysomelid-fauna of Japan recently.



Text-fig. III

Lema diversa var. *doii* nov. var. (Ca × 8)

17. *Lema downesii* BALY

Lema Downesii BALY, Ann. Mag. Nat. Hist., (3), XVI, p. 156 (1865); BALY, Trans. Ent. Soc. Lond., 1873, p. 75 (1873); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 752 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 174 (1887).

Lema Downesi GEMMINGER & HAROLD, Cat. Col., XI, p. 3253 (1874); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 7 (1904); JACOBY, Fauna Brit. Ind., Col. II, Chrys. I, p. 43 (1908); CLAVAREAU, Col. Cat., LI, p. 62 (1913).

Lema nigrosuturalis CLARK, Cat. Phyt., App., p. 37 (1865).

Local Distribution: Nagasaki (after J. S. BALY).

General Distribution: Kyushu; India.

Japanese Name: Sesuji-kubiboso-hamushi.

Remarks: Since J. S. BALY *(3)* recorded the occurence of this species at Nagasaki, so far as I am aware of, no one added any locality in our faunal region, due to be quite rare. Also unfortunately no specimen has been available to me for examination.

18. *Lema minutissima* PIC

Lema minutissima PIC, Mél. Exot. Ent., XL, p. 18 (1923); WINKLER, Cat. Col. reg. Palaearc., X, e. 1232 (1929).

Local Distribution: "Japon" (after M. PIC).

General Distribution: Japan.

Japanese Name: Hime-kubiboso-hamushi.

Remarks: This species, originally described from Japan without any denotation of detailed locality, seems to be a very rare one in our faunal region, and as far as I am aware of, only the type specimen in PIC's collection is at present known.

19a. *Lema decempunctata japonica* WEISE

Lema decempunctata GEBLER var. *japonica* WEISE, Horae Soc. Ent. Ross., XXIII, p. 562

(1889); JACOBY & CLAVAREAU, Gen. Ins., XXIII, p. 7 (1904); CLAVAREAU, Col. Cat., LI, p. 61 (1913); WINKLER, Cat. Col. reg. Palaearc., X, e. 1232 (1929).

Lema decempunctata (nec GEBLER) BALY, Trans. Ent. Soc. Lond., 1873, p. 76 (1873); LEWIS, Cat. Col. Jap. Arch., p. 27 (1879); JACOBY, Proc. Zool. Soc. Lond., 1885, p. 753 (1885); SCHÖNFELDT, Jahrb. Nass. Ver. Naturk., XL, p. 174 (1887); MATSUMURA, Thous. Ins. Jap., IV, p. 32, Pl. LVIII-fig. 21 (1907); NAWA, Konchû Sekai, XII, p. 363, Pl. XI-fig. 1 (1908); DOI, Dôbutsu. Zasshi, XXXIX, p. 327 (1927).

Local Distribution: Nakano, Prov. Musashi (June 12, 1912, leg. H. TAKABAYASHI), Komaba, Prov. Musashi (May 14, 1912, leg. H. TAKABAYASHI), Gifu (June 9, 1893, leg. Y. NAWA), Takasago, Prov. Harima (May, 1903, leg. S. MATSUMURA), Hyôgo, Prov. Settsu (April 14, 1914, leg. S. HIRAYAMA), Keijo (June 5, 1922, leg. G. TAKAGI) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Mizoro-Ike, Prov. Yamashiro (June 21, 1918, leg. M. SUZUKI), Kagoshima (May 12, 1912, leg. T. ESAKI), Toso, Prov. Satsuma (April 23, 1916, leg. T. ESAKI) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.]

General Distribution: Honshu, Kyushu, Chosen.

Japanese Name: Tohoshi-kubiboso-hamushi.

Remarks: J. WEISE *(38)* separated the Japanese form as a variety from the typical species which occurs in the central Mongolia and Siberia, by a darker colouration and more conspicuous punctation. On closer examination of many specimens from many localities of our faunal region, I should like to regard WEISE's diagnosis of var. *japonica* as a rather constant character of local form or subspecies. According to J. S. BALY *(3)*, the typical species is distributed also in the North China. BALY also noted that in Japan this species occurs commonly along the coast-regions, where it is found on the tea-plant. On the other hand, U. NAWA *(29)* reported that this is common in the vicinity of Gifu and defoliates the leaves of *Lycium chinense* ("Kuko"). According to NAWA, the adult of this insect deposits dull yellowish eggs in a mass of about five or six to fifteen, and the larvae, covered with a mucous secretion, eat the leaves, sometimes devouring them altogether.

19b. *Lema decempunctata japonica* WEISE var. *brunneipennis* MATSUMURA (MS.), nov. var. [Text-fig. IV]

Diagnosis: This variety differs from the typical form in having the complete evanescence of the steel-blackish spots on the elytra, and also in having the entirely blackish legs.

Measurements: Length of body, 5.0 mm.; width of body 2.3 mm.

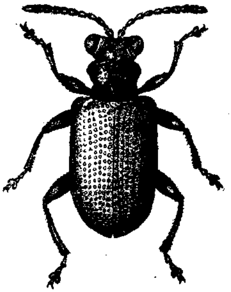
Local Distribution: Kameoka, Prov. Tamba (May 7, 1915, leg. M.

SUZUKI) [in the collection of the Hokkaido Agr. Exp. Sta.]; Nakano, Prov. Musashi (June 12, 1912, leg. H. TAKABAYASHI), Tokyo (May, 1914, leg. M. GALLOIS) [in the collection of the Ent. Mus., Facul. Agr., Hokkaido Imp. Univ.]; Mizoro-Ike, Prov. Yamashiro (June 21, 1918, leg. M. SUZUKI) [in the collection of the Ent. Lab., Dept. Agr., Kyushu Imp. Univ.].

General Distribution: Honshu.

Japanese Name: Mumon-kubiboso-hamushi.

Remarks: *Lema decempunctata japonica* is, as mentioned already by J. S. BALY (3), among the most variable examples in the markings. I found in the specimens at my disposal that the number of steel-black spots on the elytra varies from four to ten among the individuals. However, it may be convenient to arrange the form, of which the spots on the elytra are completely obsolete, as a distinct variety.



Text-fig. IV

Lema decempunctata japonica var. *brunneipennis* nov. var. (Ca ×8)

(2) Key to the Japanese Species of *Lema*

As is enumerated in the foregoing pages, we can recognize in Japan nineteen valid species and three varieties of the genus *Lema* at present, and they can be readily distinguished in the following table:

1. Prothorax metallic blue or steel-black. 2
   Prothorax red or rufous. 10
2. Elytra testaceous and prothorax steel-black. 3
   Elytra and prothorax concolorously metallic blue.... 4
3. Elytra with steel-black spots, number of which vary from 4 to 10; legs with the basal halves of femora and the middles of tibiae rufous. ... ... *L. decempunctata japonica*
   Elytra with no steel-black spot; legs entirely black. ... *L. d. japonica* var. *brunneipennis*
4. Head with light coloured markings. 5
   Head without any marking. 6
5. Size larger (5.0–5.5 mm.); head with a transverse rufous marking or the vertex; legs concolorously black. ... ... *L. coronata*
   Size smaller (3.0–3.5 mm.); head with an ill-defined but raised fulvous spot at the middle between the upper portion of eyes; legs fuscous excepting the basal halves of femora, apices of tibiae and tarsi which are blackish. ... ... *L. dilecta*
6. Legs testaceous or dark brown.... ... ... *L. tristis*

Legs blackish or bluish black. 7
7. Prothorax constricted just before the base; less than 4.5 mm. in the body-length. ... ... *L. cyanella sapporensis*
Prothorax constricted just behind the middle; more than 4.5 mm. in the body-length.... 8
8. Pronotum impressed rather closely with large and strong punctures, being pock-marked.. ... ... *L. puncticollis*
Pronotum impressed with rather small but deep punctures.... 9
9. Last three ventral segments of the abdomen testaceous or dark brown. ... *L. concinnipennis*
Ventral segments of the abdomen entirely blackish. ... ... *L. concinnipennis* var. *ventralis*
10. Pronotum with four quadrately situated blackish spots. ... ... *L. adamsii*
Pronotum without any spot. 11
11. Elytra entirely metallic blue. 12
Elytra rufous, with dark coloured vittate markings, or metallic blue with testaceous markings.... 15
12. Head shiny, black or metallic blue.... 13
Head shiny, rufous. 14
13. Ventral segments of the abdomen blackish; antennae black with the two basal joints dark brownish; the apices of tibiae slightly infuscated; trochanter yellowish brown. ... ... *L. oryzae*
Ventral segments of the abdomen metallic blue; antennae entirely black; trochanter and the apices of tibiae black. ... ... *L. melanopa*
14. Under surface of the body rufous; legs rufous with the tibiae and tarsi black. ... ... *L. fortunei*
Under surface of the body black excepting those of the head and prothorax; legs entirely shiny black. ... ... *L. honorata*
15. Elytra metallic blue in the greater part. 1
Elytra rufous or fulvous, sometimes with vittate markings.... 19
16. Elytra with a broad common transverse fulvous fascia on the middle of third of them. ... ... *L. delicatula*
Elytra without a transverse fulvous fascia. 17
17. Elytra with a rectangular sutural fulvous marking behind the base and a fulvous apical area.... ... ...*L. scutellaris*
Elytra with a fulvous apical portion only. 18
18. Legs entirely black, ventral segments of the abdomen blackish, with last two or three segments fulvous. ... ... *L. lewisii*
Legs blackish with the basal halves of femora rufous; ventral segments of the abdomen fulvous or flavous.... ... ... *L. formosana*
19. Elytra entirely rufous.... 20
Elytra rufous or fulvous with vittate markings. 21
20. Size larger (5.5-6.0 mm.); legs black. ... ... *L. diversa*
Size smaller (3.0 mm.); legs testaceous. ... ... *L. minutissima*
21. Antennae entirely black; elytra rufous with a bluish black longitudinal band on each; legs black. ... ... *L. diversa* var. *doii*
Antennae fuscous with the fulvous basal joint; elytra pale fulvous with a black sutural band; legs fulvous with fuscous tarsi. ... ... *L. downesii*

3. Comparison with the Hitherto Known *Lema*-Species infesting the Gramineous Plants in the Palaearctic Region

(1) Comparison of the Graminivorous *Lema*-Species in the Palaearctic Region

So far as I am aware of, the following five species of the genus *Lema* have hitherto been known as the feeders of the Gramineous plants in the Palaearctic region, or from Europe to Asia.

1) *Lema oryzae* KUWAYAMA	In Japan, especially in Hokkaido, Honshu, Chosen and Taiwan.
2) *Lema melanopa* LINNÉ	In Europe, North Africa and Siberia, especially in England, Hungary, Russia, etc.
3) *Lema hoffmannseggi* LACORDAIRE	In Europe and North Africa, especially in the south-eastern part of the Continent, such as Portugal and Spain.
4) *Lema tristis* HERBST	In Europe, Siberia and Japan, especially in France.
5) *Lema cyanella* LINNÉ	In Europe and Siberia, especially in Germany.

Of the above-mentioned species, we can easily discriminate *L. oryzae* on the adult-stage from others as is shown in the following key:

1. Upper surface of the body entirely metallic blue or cyaneous. 2
   Prothorax bright red or rufous, elytra metallic blue. 3
2. Legs bluish black or blackish. ... ... *L. cyanella*
   Legs testaceous or dark brown. ... ... *L. tristis*
3. Upper surface of the body dark metallic blue, except reddish or ferrugineous pronotum. Legs also dark metallic blue. Elytra deeply punctate-striate. ... *L. hoffmannseggi*
   Upper surface of the body metallic blue or cyaneous, with the pronotum red or ferrugineous. Legs concolorous with the pronotum, except the tarsi and the apices of tibiae darkened. 4
4. Ventral segments of the abdomen metallic blue. Antennae entirely black. Trochanter black. ... ... *L. melanopa*
   Ventral segments of the abdomen blackish. Antennae black with the two basal joints dark brownish. Trochanter brownish yellow. ... ... *L. oryzae*

As S. HÄNSEL *(46)* stated already, the immature stages of these leaf-beetles are quite alike, and it is very difficult to discriminate one from another during the immature stages, as nowadays there is not much literatures on the detailed morphology and ecology. However, we can observe

some ecological points of agreement and difference between them from the previous records. So far as I am aware of, the following ecological characters can be noticed as special features common to the above mentioned species:

1. Annual number of generation is generally restricted to one. The production of two or more generations is sometimes reported, but it is exceptional and very rare. As the adults live for a long time, so it is liable to be mistaken under natural conditions as if two or more generations were produced in a year or the ovipositions by the newly emerged adult were done.

2. Overwintering form is usually in the adult-stage.

3. The injury to crops is caused by the adults and by the larvae. The feedings by both are similar and are effected by the removal of longitudinal stripes from the leaves, the lower epidermis being left intact.

4. In the temperate zone, the active time, or the duration of feedings by the adult and larva, is in the spring time, and usually continues up to the mid-summer.

5. The larva remains covered with excreta during the greater part of its active life.

6. The pupa is enclosed in a cocoon.

On the contrary, there are some different ecological habits among the species. On the selection of food-plants, W. E. H. Hodson (*47*) stated in regard to *L. melanopa* in the Great Britain that "barley, oats and wheat, in the order named, are the favourite larval food-plants in this country; larvae have been found in the field on Cocksfoot (*Dactylis glomerata*), Timothy (*Phleum pratense*), and Couch (*Agropyron repens*), and have been reared satisfactorily on Canary grass (*Phalaris canariensis*); adults feed freely on any cereal, particularly in the spring and early summer, but their staple food after harvest is Cocksfoot". S. Hänsel (*46*) found that the larva of *L. cyanella* in Germany up to mid-June feeds on barley, oats, rye and wheat. J. Feytaud (*45*) observed in France on *L. tristis* that Italian millet (*Panicum italicum*) is a preferred food, the common millet in adjoining fields being very little damaged, and the maize not at all. As already stated, the principal food-plant of *L. oryzae* is only the rice-plant. These accounts are enough to distinguish *L. oryzae* from the other related species.

On the pupating habit, S. Hänsel (*46*) called attention to the fact that the situation of pupation differs between *L. cyanella* and *L. melanopa*. That is, the cocoon of *L. cyanella* is formed of a white quick hardening

secretion from the mouth, and is usually placed on the upper leaf-surface and very rarely between the ear-awns, while *L. melanopa* pupates in an earthen thin membranous envelope hidden underground. The cocoon of *L. oryzae*, as stated in the preceding pages, is formed of a white secretion, and is usually placed on the upper surface of leaves, but sometimes on the ground and rarely under the ground. In regard to these facts, we can recognize that *L. oryzae* is the mediate between *L. melanopa* and *L. cyanella*, or rather similar to the latter, in spite of more resemblance existing in the adult-characters to *L. melanopa.*

(2) More Detailed Difference between *L. oryzae* and *L. melanopa*

Here I desire to detail my careful observations on the difference between the rice leaf-beetle and the European *Lema melanopa* not only on the morphological characters but also on the ecological characters.

(On the morphological characters of the adult)

L. oryzae

1. Size smaller. Length of body (♀) 4.76 mm. and the width 1.75 mm. on the average.
2. Antenna blackish, except two basal joints, which are shiny dark brown on the upper and dark yellowish brown on the under surface. The interjoint-membrane brownish. Length-comparison of the joints is as follows:
   XI> V> VI. VII> VIII> IX> X> IV> I> III> II (♂)
   Length of antenna (♂) 2.091 mm. on the average. [Pl. I-fig. 1]
3. Elytra thinner. Length and width of elytron (♂) 3.275 mm. and 1.04 mm. on the average. [Pl. I-fig. 7]
4. Legs bright brownish yellow, except the coxae blackish, tarsi dark brown, and the apices of tibiae darkened. Claws comparatively longer. Average lengths of legs including the claws, and those of claws in the male are as follows:

	Total length of leg	Claw
	mm.	mm.
Fore leg	2.976	0.116

L. melanopa

1. Size larger. Length of body (♀) 4.95 mm. and the width 1.90 mm. on the average.
2. Antenna blackish, except the basal joint, which is dark cyaneous in colour. The interjoint-membrane blackish. Length-comparison of the joints is as follows:
   V> VII> XI> VI> VIII> IX> X> IV> III> I> II (♂)
   Length of antenna (♂) 2.523 mm. on the average. [Pl. I-fig. 4]
3. Elytra thicker. Length and width of elytron (♂) 3.383 mm. and 1.05 mm. on the average. [Pl. I-fig. 8]
4. Legs bright reddish brown, except the coxae, trochanter, tarsi and the apices of tibiae blackish. Claws comparatively shorter. Average lengths of legs including the claws, and those of claws in the male are as follows:

	Total length of leg	Claw
	mm.	mm.
Fore leg	3.306	0.096

Middle leg	3.128	0.132
Hind leg	3.444	0.132

[Pl. I–fig. 14]

5. The abdominal sternites blackish, covered densely with grayish yellow pubescence and closely punctured. The intersternal membrane pale brown, without marking. [Pl. I–figs. 12 & 13; Pl. II–fig. 9]

6. The penis glossy yellow, spatulate in shape, its apex being sharply pointed. At the distal one-third of each lateral fold there is a S-shaped reddish brown marking. The length 0.824 mm., the height 0.243 mm. on the average. [Pl. II–fig. 2]

Middle leg	3.387	0.096
Hind leg	3.891	0.107

[Pl. I-fig. 15]

5. The abdominal sternites shiny metallic greenish blue and sparsely punctured, the pubescence being very few. The intersternal membrane brownish, finely reticulated with transverse hexagonal markings all over. [Pl. I–fig. 16a; Pl. II–fig. 10]

6. The penis dark brown, spatulate in shape, but its apex obtuse. No conspicuous marking. The length 0.88 mm., the height 0.39 mm. on the average. [Pl. II–fig. 3]

(On the morphological characters of the egg)

7. Egg elongate ovoid in shape, rounded at the narrow end and somewhat angulated at the broad end. Length 0.807 mm. and the width 0.375 mm. at the middle on the average. [Pl. II–fig. 4a]

7. Egg cylindrical, rounded at ends. Length 1.092 mm. and the width 0.533 mm. on the average. [Pl. II–fig. 4b]

(On the morphological characters of the larva)

8. On the prothoracal shield of the full-grown larva, many dark brownish spots are scattered. [Pl. II–fig. 6]

8. On the prothoracal shield of full-grown larva, a few brownish spots are restricted on the posterior area.

(On the food-plants)

9. Rice-plant is only the food-plant for the larva. Our experiments on many cereals other than the rice-plant have been failures. Adults feed occasionally on *Phragmites communis*, Orchard grass, Timothy, *Zizania latifolia*, *Imperata cylindrica* var. *Koenigii*, etc., especially prior to the growing of rice-plant in spring. According to my repeated experiments, however, the rice-plant is also only the favourite food-plant for the adult among the cereals and grasses cultivated in Hokkaido.

9. Barley, oats and wheat, in the order named, are the favourite larval food-plants. Larva is also found in the field on Orchard grass, Timothy, and Couch (*Agropyron repens*), and it may be reared satisfactorily on Canary grass (*Phalaris canariensis*). Adult feeds freely on any cereal, particularly in spring and in the early summer, but its staple food after harvest is Orchard grass. [After W. E. H. HODSON (*47*)].

(On the habits of oviposition)

10. The eggs are usually placed on the leaves, adjoining rather roughly each other in a mass. [Pl. II–fig. 5]
The number of eggs in a mass varies from 1 to 46, the majority containing from 3 to 12 eggs. However, single deposition occurs as a rare and an abnormal case.

10. The eggs are laid singly, each on a carefully selected site. It is a quite rare case that two or more eggs are adjoined.

(The construction of cocoon and the pupating place)

L. oryzae	*L. melanopa*
11. The cocoon is a whitish fragile chamber constructed by the secretion of the larva, though the cocoon is formed on or under the ground; though attached to some particles of soil, the adherence is not so compact. [Pl. IV–fig. 3]	11. The cocoon is constructed by the secretion of the larva in the soil, and adheres compactly to soil-particles.
12. In the case of ordinary rice-field, the greater part of the cocoon are situated on the upper surface of leaves, and a few are in the soil. In the case of upland rice-field, most of cocoons are formed on the surface of ground, next to this they are formed on the leaves, and a few are in the soil.	12. The larva invariably pupates in the soil.

4. Discussion

So far as my studies go, among many hitherto known species of the genus *Lema* the one most closely related to the rice leaf-beetle is, of course, *Lema melanopa* LINNÉ. However, as already has been mentioned in detail in the foregoing pages, I found many important differences between two species not only on the morphological characters of the adults as well as of the immature stages, but also on the ecological characters. It is very interesting to me that the differences of the morphological characters of the adult between two species are proved substantially by the early descriptions of senior entomologists. On *L. melanopa* J. CURTIS (*44*) recorded the diagnosis in his "Farm Insects" published in 1883, and Toraji TANAKA (*92*) of the Niigata Agricultural Experiment Station published in 1901 a very thorough description on the rice leaf-beetle. Some important portions of these two works are given as follows:

L. oryzae	*L. melanopa*
[After Toraji TANAKA (*92*, pp. 54–55); carefully translated from Japanese]	[After J. CURTIS (*44*, p. 308)]
[Antennae] Antennae are filiform, 2.1 mm. in length, and with eleven joints; basal joint is large but short, the second small, these two joints being yellowish brown, shining, and without pubescence; the following nine joints are blackish brown, each joint being twice as long as the width, the terminal one	[Antennae] "The antennae are twice as long as the thorax, subclavate, black and pubescent, excepting the basal joint, which is green, shining, and globose; second small; third and fourth obovate; the following compressed, broader, and obovate-truncate; apical joint conical."

conical, and densely covered with grayish yellow pubescence, having four long hairs on each apical margin of the joints.

[Abdomen] Abdomen is of seven segments; yellowish brown dorsad, deep black ventrad and with grayish pubescence densely.

[Abdomen] "The under side is deep blue and punctured."

[Legs] "The six legs are pale yellowish brown, except the coxae blackish; the femora are stout; the third joints of the tarsi bilobed, and hide the fourth and a part of the fifth; each joint of tarsi provided with grayish yellow pubescence, except the fourth.

[Legs] "The six legs are bright and deep ochreous; the trochanters black; the thighs are stout: the tips of the tibia are dusky, and the tarsi are black and pubescent: they are four-jointed, and cushioned beneath; the two basal joints are elongated, third bilobed, fourth the longest, slender, clavate, and furnished with two simple claws."

The above comparison fully agrees with the result of my studies as already mentioned.

In naming the rice leaf-beetle as *L. oryzae*, I should say a few words. It is an explanation in regard to the name *L. flaviceps*. In his excellent work "Nippon Nôsakumotsu Gaichû Hen" published in 1899, C. SASAKI (*79*) recorded this species under the name of "*Lema flaviceps* Suff.", and this name was followed by some entomologists and agriculturists in Japan up to the present time. Since E. SUFFRIAN never named "*flaviceps*" at least in the genus *Lema*, and at the same time the name "*flaviceps*" has its own meaning, it appears to have the rights of priority. However, C. SASAKI (*79*) wrote "Suff." as the author-name, and in 1919 he (*80*) adopted "*Lema tristis* Hbst.", admitting the synonym of *L. flavipes*. In fact, it is apparently possible to cause an illusion that the pronotum of the rice leaf-beetle is bright yellowish brown to reddish brown colour. From these facts, "*flaviceps*" should be admitted as an error of transcription for "*flavipes.*" So I proposed another name "*oryzae*" to the rice leaf-beetle, in accordance to the Nineteenth Article of the International Rules of Zoological Nomenclature, revised in 1927.

VII. DISTRIBUTION AND ORIGINAL HOME

It is difficult to determine the exact distribution of the insect in Japan as there is not much literature on the subject. However, as I said before, this insect occurs all over Hokkaido, Honshu, Shikoku, Kyushu, Chosen

and Taiwan; that is, the distribution is extended from about 22.°5 to about 44° in the north latitude and within about 121° and 144° in the east longitude at present.

In Hokkaido, though this beetle was already known before 1898, its distribution was limited only to the Oshima Peninsula until 1913. The bad harvest of that island in 1913, caused insufficiency of seeds in the following year, and in the spring of 1914 some farmers in the Iwanai district of the County of Shiribeshi and the Usu district of the County of Iburi procured the young rice-plants from the Counties of Oshima and Hiyama. Unfortunately this transportation proved to be the cause of distributing the worst beetle to the areas just referred to, and the beetle soon spread over the neighbourhood of these localities. In 1921, the beetle distributed all over the County of Shiribeshi, and in 1926 it covered the fields as far north as Sapporo, and even extended its damages to the County of Urakawa. From 1921 to 1922, the Kamikawa district of the County of Kamikawa, the Uriu district of the County of Sorachi and the Nakagawa district of the County of Kasai became the centres of the infestation of this beetle. From 1926 to 1927 we found the centres of infestation in the Mashike district of the County of Rumoe and the Tokoro district of the County of Abashiri. The infestations gradually grew from these centres to the neighbourhood, especially so in the northern part of the Counties of Kamikawa and Sorachi. According to the inquiry of the Hokkaido-Government in 1929, the infested area by this leaf-beetle ran up to 62143 Chôbu,[1] it being about one-third of the total rice-field in Hokkaido. It is noticeable also that the infestation by the leaf-beetle is severer and more widely extended in the western half, bounded by the Hitaka and Kitami Mountain-ranges, than that in the eastern half.

In Honshu, the rice leaf-beetle is widely distributed from Aomori Prefecture in the north to Yamaguchi Prefecture in the south. The Board of Agriculture of the Department of Agriculture and Forestry of Japan (*93*), recorded in 1929 twenty-two prefectures as infested localities by this beetle. According to their surveys, the infestations in Aomori, Niigata, Toyama, Ishikawa, Nagano, Kyoto, Hyogo (the Province of Tajima only), Tottori, Shimane, Okayama (the mountain districts only) and Yamaguchi Prefectures are severer than those in Iwate, Miyagi, Akita, Ibaragi, Tochigi, Saitama, Fukui, Yamanashi, Gifu, Shizuoka and Aichi Prefectures. However, as far as I am aware of, besides the prefectures mentioned above, this beetle is also distributed in Yamagata, Fukushima,

1) 1 Chôbu=0.992 hectare.

Gunma and Hiroshima (the mountain districts only) Prefectures, and the severe infestations in the former two are heretofore known. In view of this fact, the infestation by this beetle is severer along the coast of the Sea of Japan than in the Pacific sea-board of Honshu. Moreover, this leaf-beetle has proved also to be harmful to the rice-field in the Islands of Sado and Oki.

In Shikoku, according to the official communications from four Prefectural Agricultural Experiment Stations, this beetle occurs rarely in Tokushima and Kagawa Prefectures, and the infestations are very slight.

In Kyushu, the mountain district in Ôita Prefecture is only the known habitat of this beetle, and according to the official communication from the Ôita Agricultural Experiment Station this beetle gives a slight injury, and does not seem to be an important pest.

In Chosen, according to S. NAKAYAMA (*64*), this leaf-beetle occurs abundantly in the mountain districts of Kankyô-Nandô, Kankyô-Hokudô, Heian-Hokudô, Kôgendô and Keishô-Nandô. The Kankyô-Hokudô Agricultural Experimental Farm (*100*) also reported a severe injury by this leaf-beetle in that prefecture in 1924. It may be recognized that this beetle has a tendency to distribute to the eastern half of the Peninsula.

In Taiwan, according to J. SONAN (*86*, *87*), this leaf-beetle is one of the most important noxious pests to the rice-culture, and its occurrence is limited to the submontane districts. This species is now extending towards the southern parts; about ten years ago its distribution was only limited to Taihoku and Shinchiku Prefectures, and the Daiankei Valley which forms a boundary between Shinchiku and Taichû Prefectures was the boundary of the distribution of this pest, but recently it was found in the Tôsei, Toyohara and Nôkô districts of Taichû Prefecture in the west and in the submontane districts along the coast of the Karenkô and Taitô Prefectures in the east as well as in the Kashôtô Island (Samasana). It seems as though this leaf-beetle in Taiwan has a tendency to distribute gradually from the north to the south.

Generally speaking, though it is widely distributed in Japan, the rice leaf-beetle occurs abundantly around the coast of the Sea of Japan with the exception of Taiwan; therefore the infestation is more serious in these localities than in the Pacific sea-board of Japan.

It is important to determine the actual locality, where this beetle is indigenous, and whence it spreaded to other localities. In Hokkaido and Taiwan, as stated above, the infested districts are yet limited, and the infestation now only gradually broadens to the north or the south, so that

these localities do not seem to be the original home of this species. Also Shikoku and Kyushu are not probable the original homes of this insect.

Most likely the original home may be found along the coast of the Sea of Japan in Honshu, especially in the region from Yamagata to Ishikawa Prefectures. However, as it is rather difficult to determine it at once, I shall discuss this matter later on.

VIII. NATURAL ENEMIES

There are some records on the parasites of the rice leaf-beetle but none on the predaceans. Birds, frogs and spiders may, to a certain extent, take part in destroying the leaf-beetle in its various stages, although I have no positive evidence to prove that such is the case. In this paper, however, I shall touch on the parasitic and predaceous insects only.

(1) Parasitic Insects

In 1901, T. TANAKA (*92*) described a Chalcid-fly under the name "Doromushi-midori-kobachi", which bred on the pupa of the rice leaf-beetle in Niigata Prefecture. As far as I am aware of, this is the first record on the parasites of the beetle referred to, and it is probably identical with *Trichomalopsis shirakii* CRAWFORD. In the year following, the Niigata Agricultural Experiment Station (*122*) recorded one more parasite, which belongs to the Ichneumonidae and named as "Doromushi-kuro-himebachi". According to the exact coloured plate annexed, it is no doubt that this Ichneumon-fly is referred to *Bathythrix kuwanae*, of which H. L. VIERECK (*121*) described in 1912 on the specimens bred on the larva of the rice leaf-beetle by S. I. KUWANA. In 1913, J. OKADA (*69*) reported his ecological observations on the parasites. According to him, one species of *Anaphes*, two Ichneumon-flies, one of which may be referred to as *Bathythrix* sp., and one Pteromalid-fly inhabit in Yamaguchi Prefecture. The percentage of parasitism of the egg-parasite attained about 63 per cent and that of parasites on the larva about 33 per cent on the average. In the same year, J. C. CRAWFORD (*107*) described a new genus and species under the name of *Trichomalopsis shirakii* based on the specimens bred on the pupa of the rice leaf-beetle by T. SHIRAKI.

In 1915, S. INAMURA (*111*) reported on the status of the parasites of the rice leaf-beetle in Taiwan. According to him, *Trichomalopsis shirakii* is a very beneficial Pteromalid-fly that devours this leaf-beetle; the percen-

tage of parasitism in Shinchiku Prefecture attained 75.9 per cent on the surveys carried out in May, 1914. Besides this species, one egg-parasite and one Ichneumon-flies on the larva, both undetermined, were reported in this paper. In 1922, the Hokkaido Agricultural Experiment Station (*96*) reported the occurrence of two species of parasites from the cocoons of the rice leaf-beetle, which are identical with the species reported from Niigata Prefecture. In 1928, T. UCHIDA (*119*) recorded "*Lema tristis*" as the host of *Nesopimpla naranyae* ASHMEAD besides *Naranga aenescens*. In the same year, I (*54*) also reported on the status of the parasites of the rice leaf-beetle in Hokkaido, enumarating one egg-parasite, *Polynema* sp., and three species of parasites on the larva and pupa, *Anilastus* sp., *Nesopimpla naranyae* ASHMEAD and *Pteromalus* ? sp.

In 1930, J. SONAN (*116, 117*), furnished two papers concerning the Ichneumon-flies bred on the rice leaf-beetle. The species enumerated is as follows:

Anilasta japonica SONAN
Pezomachus lemae SONAN
Bathythrix kuwanae VIERECK
Habrocryptus ruficoxatus SONAN
Batithrix kuwanae var. *nigrans* SONAN
Batithrix rufus SONAN
Melcha lemae SONAN

By these works the following nine species and one variety parasitic on the rice leaf-beetle may now be known.

Mymaridae	Mymarinae	(1) *Anaphes nipponicus* KUWAYAMA (sp. nov.)
		(=*Anaphes* sp. =*Polynema* sp.)
Pteromalidae	Pteromalinae	(2) *Trichomalopsis shirakii* CRAWFORD
Ichneumonidae	Ophioninae	(3) *Anilastus japonicus* SONAN
		(=*Anilasta japonica* SONAN)
"	Pimplinae	(4) *Nesopimpla naranyae* ASHMEAD
"	Cryptinae	(5) *Melcha lemae* SONAN
"	"	(6) *Habrocryptus ruficoxatus* SONAN
"	"	(7) *Pezomachus lemae* SONAN
"	"	(8a) *Bathythrix kuwanae* VIERECK
		(=*Hemiteles narangae* UCHIDA)
"	"	(8b) *B.* *kuwanae* var. *nigrans* SONAN
"	"	(9) *B.* *rufus* SONAN (=*Batithrix rufus* SONAN)

As far as it is known, however, the members of the genera *Pezomachus* and *Bathythrix* are mostly secondary parasites, and it is probable that *P. lemae*, *B. kuwanae*, *B. kuwanae* var. *nigrans* and *B. rufus* may be also the secondary parasites to the rice leaf-beetle for the reasons to be discussed later on, though their exact host relationships are not yet clear enough.

A. Primary Parasites

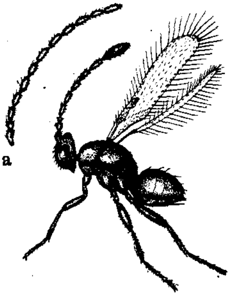
1. *Anaphes nipponicus* sp. nov. [Text-figs. V & VI]

(Doromushi-mukuge-tamagobachi)

Anaphes sp., OKADA, Yamaguchi Agr. Exp. Sta., Ex. Rep. 3, p. 9, Pl. II-fig. 1 (1913).
Polynema sp., KUWAYAMA, Hokkaido Agr. Exp. Sta., Bul. 47, p. 68 (1928).

This fairy fly belonging to the tribe Anaphini, subfamily Mymarinae, family Mymaridae of superfamily Chalcidoidea, is distributed in Japan through Hokkaido and Honshu, and acts as an important natural enemy, parasitic on the eggs of the rice leaf-beetle.

Morphological Characters of the Adult: [Female] General colour shiny black uniformly, with sparse whitish gray hairs. Scape and pedicel dark yellow, remaining antennal joints dark brown, all covered with moderate whitish gray hairs. Eyes mat black. Legs clay-yellow, with moderate concolorous pubescence, except the middle and hind coxae which are concolorous with the body. Wings hyaline, iridescent, fumate especially on the margins and bases, with brownish fringes and discal cilia; venation of fore wing dusky, inconspicuous.



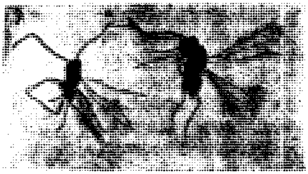
Text-fig. V

Anaphes nipponicus sp. nov. Female (Ca ×65)
a. Antenna of the male.

Body apparently impunctate. Head somewhat wider than the thorax and flexed obliquely downwards; face flattened; vertex produced acutely, with three ocelli; eyes large, ovoidal; mandibles acute and sharply curved. Antennae rather shorter than the body, 0.525 mm. in length, nine-jointed; scape cylindrical, somewhat dilated below, more than thrice as long as wide; pedicel much dilated apically, a little shorter than a half of the scape and about twice as long as wide at the apex; funicle-joints much longer than wide, slightly widening distad; first joint the shortest, much shorter than a half of the pedicel or the second funicle-joint, a little shorter than twice as long as wide; second funicle as long as the pedicel, while as wide as the first funicle; third to sixth funicle-joints subequal in shape, cylindrical, a little more than thrice as long as wide; the last joint or club the longest, somewhat spindle-shaped, a little shorter than the last two funicle-joints combined, its width being a little slenderer than twice as wide as the last funicle-joint. From the third to

sixth funicle-joints with each a sensorium as a long paler furrow visible from one side, and the club with four sensoria as paler furrows.

Thorax nearly as long as the abdomen, well developed, but not arched. Fore wings long and narrow, 0.66 mm. in length and 0.10 mm. in width, slightly curved at the apical fourth, narrower at the base in normal, somewhat rounded at the apical margin; discal cilia arranged in from 6 to 9 longitudinal lines, uniform, but the lines not at all in regular rows; an oblique proximo-caudal line of discal cilia running back from the marginal vein, containing about 13 cilia. The neuration reaches nearly to one-third of the wing-length, marginal nervure lengthened and slightly indented at the distal half, bluntly ended, with 9 to 10 bristles. The marginal cilia or fringe very long, of which the longest is measured 0.144 mm., being about one and a half times as long as the greatest width of the wing, and at the distal posterior angle. Hind wings a little shorter than the fore wings, slender and sharpened at the apex, and petiolate at the base, 0.58 mm. in length and 0.03 mm. in width. The longest of the marginal cilia is about six times as long as the width of the wing, measuring 0.18 mm. Discal ciliation is very sparse, the second row being just in advance of the mid-line. The apex of petiole terminated with several curved bristles or hamuli.



Text-fig. VI

The female and male of *Anaphes nipponicus* (Photograph of the mounted cotype-specimens.)

Legs slender, with four tarsal joints. Fore leg 0.61 mm. in length; first trochanter longer than the second; femur slightly shorter but broader than the tibia, provided with two curved spines near the apex; tarsus as long as or slightly longer than the tibia; the first tarsal joint with about 10 lateral ventral spines and as long as the fourth; the second and third being of the same length and shorter than the other. Middle leg 0.61 mm. in length and similar in shape to others, but the apical ventral spines weak and hardly visible. Hind leg a little longer than others, being 0.66 mm. in length; structure similar to that of the fore leg.

Abdomen subsessile and not petiolate, conic ovate in shape, the dark yellowish ovipositor slightly protruding.

[Male] Similar to the female. Antennae with twelve-joints, much

longer than that of the opposite sex, one and a half times as long as the body, 0.752 mm. in length; scape cylindrical, thrice as long as wide; pedicel much dilated apically, about a half length of the scape; funicle-joints cylindrical, with sensoria which are visible from side as a paler furrow longitudinally on each joint; first and ninth funicle-joints subequal, rather shorter than all the others; the remaining joints, including the club, almost equal in length; club bluntly pointed. Abdomen rather slender.

[Measurements] Average length of body, 0.608 mm. in the female, 0.496 mm. in the male.

Remarks on the Type-Specimens: Described from many cotype-specimens mounted in balsam and "Euparal", as well as preserved in dry and alcoholic conditions, from Kagura, Kamikawa district, County of Kamikawa and Ôno, Kameda district, County of Oshima. Cotypes are preserved in the collection of the Hokkaido Agricultural Experiment Station.

Remarks on the Parasitism: Although the number of generations in one year is not yet fully ascertained, it is probably more than five. The adults, as in the cases of other egg-parasites, seem to dislike the dark place, and are always prowling about their host on the surface of the rice-leaves, resting their wings on the back. When the female finds the egg-mass of the rice leaf-beetle, she mounts the egg-mass and lays her egg inside the egg by means of her sharp ovipositor. According to my observations the longevity of adult, confined in a glass-tube and fed with diluted honey, was about five days; so it is probable that the adults of this fairy fly live at least over a week in nature. At present, no host other than the egg of the rice leaf-beetle is known. According to the observations by J. OKADA (*69*) in Yamaguchi Prefecture during 1911 to 1912, the average percentage of the egg of the rice leaf-beetle parasitised by this fairy fly is 62.96 per cent, being 25.64 per cent during the period of the early to the middle part in June, 66.56 per cent during the end of June, and 96.67 per cent during the early part in July. In Hokkaido, my observations show that the occurrence of *Anaphes nipponicus* is limited to the southern part of of the island. To illustrate, the records of my observations in 1928 are given as follows:

Table XXVI—*Number of the adults of Anaphes nipponicus emerged from the eggs of the rice leaf-beetle in the Province of Ishikari, Hokkaido (1928)*

Locality collected	Date of collection	Number of the egg-masses of *L. oryzae*	Number of the adults of *A. nipponicus* emerged
Kotoni, Sapporo district	July 9	105	98
Itchan, Uriu district	July 13	49	0
Fukagawa, Uriu district	"	59	0
Nagayama, Kamikawa district	July 11	138	0
Higashi-Asahigawa, Kamikawa district	"	75	0
Kagura, Kamikawa district	July 12	171	0
Kamui, Kamikawa district	"	101	0

Based on these observations and the fact of the rapid propagation of the rice leaf-beetle in the recent year in the Counties of Kamikawa and Sorachi, an experiment on the transplantation of this egg-parasite from the Counties of Oshima and Shiribeshi to the above-named Counties, was attempted by our Experiment Station. At first, during June 26 and 27 about one thousand egg-masses of the rice leaf-beetle were gathered at Ôno, Kameda district, County of Oshima, Maeda and Kozawa, both in the Iwanai district, County of Shiribeshi, and about five hundred egg-masses were transported each to Itchan, Uriu district, County of Sorachi and Kagura, County of Kamikawa respectively, then they were put into each two Miye-type and Kagawa-type of the apparatus used for protecting the emergence of egg-parasites. For the second attempt, during July 14 and 16 inclusive about four thousand egg-masses were collected at Ôno, Kameda district and about one thousand and three hundred egg-masses were transported, and were preserved respectively in the same protecting apparatus at the same localities of Itchan and Kagura. From time to time we collected about 80 to 200 egg-masses, or 528 to 1802 eggs of the leaf-beetle in the rice-field and calculated the percentage of the emerged adults of the egg-

parasite against the total number of the eggs of the rice leaf-beetle. The data obtained are tabulated as follows:

Table XXVII—*Percentage of the emerged fairy fly, Anaphes nipponicus, against the total number of eggs of the rice leaf-beetle (1929)*

Locality \ Date of the collection of egg-masses	June 25–26	July 2–3	July 11–17	July 22–27	August 2
Ôno, Kameda district, County of Oshima	% 0.78	—	% 14.33	—	—
Kozawa, Iwanai district, County of Shiribeshi	9.40	—	—	—	—
Maeda, Iwanai district, County of Shiribeshi	0.56	—	—	—	—
Itchan, Uriu district, County of Sorachi (breeding place)	—	% 0	1.17	% 3.56	—
Same (about 2 kilometers apart from the breeding place)	—	—	—	0	—
Kagura, Kamikawa district, County of Kamikawa (breeding place)	—	0	0.38	7.11	% 0.57
Same (about 2 kilometers apart from the breeding place)	—	—	—	51.53	39.01
Same (about 6 kilometers apart from the breeding place)	—	—	—	—	13.32
Nagayama, Kamikawa district, County of Kamikawa	—	—	—	4.27	38.38

As is seen in the above table, when the parasitised egg-masses were transported and protected by the use of the egg-parasite-protecting apparatus, this egg-parasite was able to settle easily in the locality where had not been any trace of this insect, as in the case at Itchan and Kagura. We examined in 1930 the collected egg-masses of the leaf-beetle from the

identical places, where the protecting apparatus were set up the previous year at Itchan and Kagura, and noticed that when once settled this egg-parasite easily hibernates and propagates in the succeeding year. The data obtained are as follows:

Table XXVIII—*Percentage of the emerged fairy fly, Anaphes nipponicus, against the total number of eggs of the rice leaf-beetle (1930)*

Locality \ Date of the collection of egg-masses	July 14	July 24
	%	%
Itchan, Uriu district, County of Sorachi	19.65	34.71
Kagura, Kamikawa district, County of Kamikawa	12.15	35.92

According to the survey of the Tokachi Branch, Hokkaido Agricultural Experiment Station, none of the emerged egg-parasites was observed from 358 egg-masses of the rice leaf-beetle, which were collected at Ikeda, Nakagawa district, County of Kasai, on July 19, 1930.

From the data obtained in 1929 and 1930, it may be inferred that the distribution of *Anaphes nipponicus* is localised in certain districts at present, though many other districts in Hokkaido also seem to be adapted to its habitation by the climatic and other environmental conditions.

The application or artificial multiplication of this natural enemy has much room for future studies, as it is very doubtful whether a proportionate reward by the practice of this method could be gained by the labour entailed or not. However, from the above it may be concluded that the collection of the egg-masses of the leaf-beetle and the protection of its natural enemy on the rice-field in the localities where *Anaphes nipponicus* is distributed are of course very desirable as one of the most effective controlling measures.

2. ***Trichomalopsis shirakii*** CRAWFORD [Text-fig. VII]

(Doromushi-midori-kobachi)

Trichomalopsis shirakii CRAWFORD, Proc. U. S. Nat. Mus., XLV, p. 252 (1913); INAMURA, Taiwan Nōjihō, 99, p. 163 (1915).

Gn. ? sp. ?, TANAKA, Niigata Agr. Exp. Sta., Month. Rep. 23, p. 57 (1901); Anonymous, Hokkaido Agr. Exp. Sta., Cir. 20, p. 8, fig. 7 (1922).

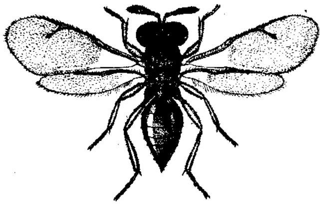
Pteromalid sp., OKADA, Yamaguchi Agr. Exp. Sta., Ex. Rep. 3, p. 9, Pl. II-fig. 3 (1913).

Pteromalus sp. ?, KUWAYAMA, Hokkaido Agr. Exp. Sta., Bul. 47, p. 69 (1928).

This species belongs to the tribe Rhaphitelini, subfamily Pteromalinae, family Pteromalidae, superfamily Chalcidoidea. This species is common in the rice-field of Hokkaido. According to the previous records, this is also known from Niigata and Yamaguchi Prefectures of Honshu and from Taihoku, Taiwan.

Morphological Characters of the Adult: [Female] General colour of the body metallic green, shining, the abdomen much darker, with a brownish tint, nitid. Body is covered with fine whitish hairs sparsely. Eyes indian-red in colour; ocelli dark yellow to reddish brown; scape and pedicel testaceous, rest of the antennae brown to dark brown, with whitish pubescence densely; mouth-part dark yellow, with reddish brown apices of mandibles. Wings hyaline, iridescent, nervures pale yellowish. Legs testaceous, except coxae which are concolorous with the body-colour, the tibiae and tarsi more whitish, apices of the terminal tarsal joints and claws darkened, provided with whitish fine hairs moderately.

Head transverse, slightly wider than the thorax, placed rather perpendicularly; occipital foraminal depression margined; the surface covered closely with thimble-like punctures; face below the antennal insertion engraved with many fine striae converging towards the mouth-part. Eyes ovate, not much raised. Ocelli with moderate distance each other, forming an obtuse isosceles triangle at the middle of vertex. Antennae rather thick, geniculate as usual, thirteen-jointed including two ring-joints (annelli); 0.96 mm. in length; basal joint very short, nearly globular; scape very long, more than one-fourth as long as the whole length of the antenna, slightly curved inwards, reaching nearly to the vertex; pedicel about one-third as long as the scape, dilated at the apex, shorter than the first funicle-joint; first ring-joint shorter than the second, both very short and narrow; each funicle-joint a little longer



Text-fig. VII

Trichomalopsis shirakii CRAWFORD
Female (Ca ×12.5)

than the width, while gradually broadened towards the distal joints, with 7 to 9 long sensoria on each; the terminal or club three-jointed, the ratio of the length being 4 : 4 : 3, each with 8 to 10 sensoria, bluntly pointed at the apex. Mandibles broad and stout, the right mandible quadridentate, the left tridentate, the teeth deeply separated, the inner one being especially sharpened.

Thorax, including propodeum, mesopleurae and metapleurae, engraved with thimble-like punctures closely as in the head, being narrower than in the head. Pronotum narrow, transverse. Metanotum wide and large; parapsidal furrows or Notauli not so much complete but distinct anteriorly and traceable backwards to nearly one-half of the notum; scutellum comparatively large, at the posterior margin nearly rounded, at the two-thirds backwards with an indistinct transverse line due to the difference in punctures; propodeum with a distinct neck, the lateral fold indistinct, due to the sculpture; median carina indistinct; propodeal spiracles small, elongate.

Fore wings broad and large, as long as the thorax and abdomen combined, 2.25 mm. in length, 0.95 mm. in width; broadened apically and rounded at the outer margin, hyaline; the fringe or marginal cilia rather short and discal ciliation very dense, without bristles on the subcostal (submarginal), marginal, radius (stigmae) and postmarginal nervures approximately 19 : 7 : 5 : 7 in ratio; radius as broad as the marginal, and much broader than the postmarginal; the radial knob thrice as broad as the radius; about 15 long bristles on the subcostal nervure; subcostal as long as a half of the wing-length and the postmarginal three-fourths. Hind wings much shorter and narrower than the fore wings, 1.55 mm. in length, 0.35 mm. in width; apex rather pointed; costal margin dented at the one-third from the base; both the costal and inner margins slightly curved basad; discal cilia rather close, inner marginal cilia very long; nervure reaching as far as two-fifths of the wing-length, with many bristles along it, and near the apex of nervure at margin with three curved bristles or hamuli.

In the fore leg, coxa with coarse raised reticulation, as twice as the trochanter; femur much shorter than the tibia, which is as long as the tarsal joints and claws combined; near the apex of tibia the spur is a little shorter than the first tarsal joint; tarsal joints 6 : 4 : 3 : 2 : 5 in length-ratio. Middle leg similar to the fore leg; femur is as long as the tibia; tarsal joints 8 : 5 : 3 : 2 : 5 in length-ratio. In the hind leg, coxa much larger than that of the other legs; femur much shorter than the tibia; only one apical spur of the tibia as a half as long as the first tarsal joint; tarsal joints 10 : 6 : 5 : 2 : 7 in length-ratio.

Abdomen smooth, shining, a little shorter than the head and thorax taken together, spindle-shaped, sharply pointed at the apex, rather flattened dorsad, subsessile, petiole not extending beyond the neck of propodeum; *ovipositor slightly* projecting beyond the apex.

[Male] Closely allied to the opposite sex, but much smaller. Abdomen a little shorter than the thorax, rather ovoidal.

[Measurements] Length of body; the female, 2.35–2.7 mm., and 2.5 mm. on the average; the male, 1.75–2.25 mm., and 2.0 mm. on the average.

Remarks on the Parasitism: The complete life-cycle has not yet been studied. In Hokkaido, emergence of the adult under natural conditions occurs at the end of July and continues throughout August. The earliest date of emergence under an observation in 1930 at Sapporo was July 22. The adult always flies out from the cocoon of the rice leaf-beetle. According to INAMURA's report (*111*), the percentage of the parasitism of this Chalcid-fly ran up to 75.9 per cent in Shinchiku Prefecture, Taiwan, in 1914. The Oshima Branch of the Hokkaido Agricultural Experiment Station investigated the conditions of this parasite from 1916 to 1920, and according to their investigations the average percentage of the parasitism of this Chalcid-fly to the rice leaf-beetle is 11.26 per cent in the Oshima Peninsula. The data obtained are as follows:

Table XXIX—*Percentage of the cocoons of the rice leaf-beetle which were parasitised by Trichomalopsis shirakii in the Oshima Peninsula*

Year / Percentage / Locality	1916		1917		1918		1919		1920	
	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined
Ôno, Kameda district	% 32.0	200	% 1.7	115	% 14.0	100	% 15.0	100	% 6.0	100
Nanaii, Kameda district	2.6	38	3.0	33	—	—	1.5	200	—	—
Kameda, Kameda district	9.5	200	12.1	58	—	—	5.8	138	9.6	73
Yunokawa, Kameda district	17.0	100	3.4	58	3.7	161	2.0	100	8.5	118

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Locality \ Percentage \ Year	1916		1917		1918		1919		1920	
	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined
Kamiiso, Kamiiso district	% 14.0	100	% 3.8	133	% 24.2	120	% 9.0	100	% 4.9	102
Kikonai, Kamiiso district	22.0	200	13.8	80	18.0	100	9.0	100	2.2	45
Shiriuchi, Kamiiso district	—	—	—	—	—	—	2.9	68	9.5	21
Tomari, Hiyama district	—	—	—	—	—	—	12.8	86	3.3	92
Kaminokuni, Hiyama district	23.0	100	9.6	156	14.0	100	14.0	93	1.8	113
Assabe, Hiyama district	35.5	200	7.5	146	—	—	1.8	113	—	—
Otobe, Nishi district	—	—	—	—	25.0	100	8.0	100	0	100
Average	22.23		6.93		15.57		6.84		4.71	

3. ***Anilastus japonicus*** SONAN[1] [Text-fig. VIII]

(Doromushi-yadori-amebachi)

Anilasta japonica SONAN, Trans. Nat. Hist. Soc. Formosa, XX, p. 269., 1 fig. (1930).
Anilastus sp., KUWAYAMA, Hokkaido Agr. Exp. Sta., Bul. 47, p. 69 (1928).

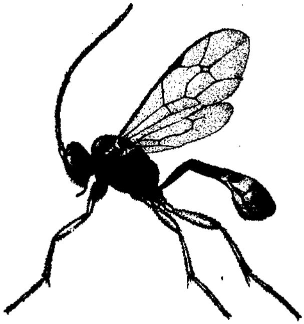
This species is a member of the tribe Campoplegini, subfamily Ophioninae, family Ichneumonidae of the superfamily Ichneumonoidea. This species is widely distributed in Hokkaido and Honshu. SONAN (*116*) recorded Hakodate, Fukushima and Nagano as the habitats; I also collected a number of the specimens at Kamishibetsu, Province of Teshio, in August, 1929.

Morphological Characters of the Adult: [Female] General colour of the body black. Eyes brownish black; ocelli dark yellow. Antennae brownish black, with the scape and pedicel yellowish brown. Mouth-part, including palpi, light yellow, with reddish brown apices of mandibles. Wings hyaline, slightly fumate, iridescent; pterostigma and nervures dark brown. Legs brownish; fore coxae, trochanters and tibial spurs of all

1) I followed the generic name after ASHMEAD's classification (*104*) and also the opinion of T. UCHIDA.

legs light yellow; hind coxae concolorous with the body; apices of the hind tibiae and of each hind tarsal joints dark brown. In the abdomen, apical halves of the second and third tergites, the lower side of the third, and the fourth segment, and sometimes the lower side of the fifth to sixth tergites brown; colouration of the abdomen considerably variable among individuals; beneath yellowish brown.

Head slightly wider than the thorax, with close and fine punctures; apparently shagreened and provided with a white pubescence rather densely; rather transverse dorsad and quadrate anteriorly; the posterior margin nearly straight. Ocellar isosceles triangle is obtuse on the vertex; a median carina from the anterior ocellus reaching almost to the space between antennal fossae; genae as long as the width of mandibles; clypeus anteriorly truncate, with rather conspicuous grooved lines on both sides. Eyes bare, large, oval, hemispherically raised. Antennae filiform, about 3.5 mm. in length, 26-jointed, densely pubescent; basal joint short and globose, scape large and elliptical, nearly twice as long as the width; pedicel short, subequal in length and width, one-third as long as the scape; annellus very short, ring-shaped; funicle-joints gradually tapering distad; first funicle-joint slender, cylindrical, four times as long as the width; terminal joint as long as the width. Mouth-part as usual; labrum small, triangular in shape; mandibles rectangular, parallel-sided, with white hairs moderately on the outer sides, bidentate, the teeth being very sharp and unequal in length; palpi very long and slender, with dense white pubescence.



Text-fig. VIII

Anilastus japonicus SONAN
Male (Ca x 10)

Thorax immaculate, closely punctate, with moderately dense pubescence; mesonotum wide, without parapsidal furrows; scutellum distinctly convex; propodeum with distinct carinae, area basalis very small, areola which is formed by a connection of the area supero-media and area petiolaris very large, elongate and apically opened; costula distinct; spiracles

small. Fore wings elongate, 3.25 mm. in length, 1.15 mm. in width, with rather dense discal ciliation; pterostigma long and narrow, 0.45 mm. in length and 0.13 mm. in height; recurrent nervure received by the areolet far beyond the middle; areolet small, rhomboidal, with a short petiole; radius distinctly and angularly curved. Hind wings rather short. Legs with dense, uniform and fine pubescence, tibial spurs 1-2-2, unequal in length, longer spur being as long as a half of the first tarsal joint; last joint of the hind tarsi very slightly shorter than the third.

Abdomen not much compressed, but gradually fusiformly thickened towards the apex, with dense pubescence; petiole long; first abdominal segment without a sharp carina and its spiracles not prominent; spiracles of the second abdominal segment at far before the middle; terebra stout, densely pubescent, only slightly projecting beyond the tip of the abdomen.

[Male] Similar to the opposite sex; abdomen rather strongly compressed behind the second segment than that of the female, truncated at the tip.

[Measurements] Length of body 4.0-4.6 mm. in the female, 4.2-5.0 mm. in the male.

Remarks on the Parasitism: The life-history is still unknown, though this species is one of the most common and important larval parasites of the rice leaf-beetle. The adult-fly gets out the cocoon of the host during July and August. According to the surveys of the Oshima Branch of the *Hokkaido Agricultural Experiment Station, during 1916 to 1920, the* percentage of the cocoons of the rice leaf-beetle from which this parasite appeared, was recorded 11.65 per cent on the average. The details of the data are as follows:

Table XXX—*Percentage of the cocoons of the rice leaf-beetle from which Anilastus japonicus appeared in the Oshima Peninsula*[1)]

Year / Percentage / Locality	1916		1917		1918		1919		1920	
	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined
Ôno, Kameda district	% 2.5	200	% 52.2	115	% 4.0	100	% 12.0	100	% 14.0	100
Nanaii, Kameda district	0	38	12.1	33	—	—	10.0	200	—	—
Kameda, Kameda district	0	200	51.7	58	—	—	16.7	138	6.8	73
Yunokawa, Kameda district	0	100	10.3	58	6.8	161	6.0	100	10.2	118
Kamiiso, Kamiiso district	0	100	5.3	133	6.7	120	12.0	100	13.7	102
Kikonai, Kamiiso district	0	200	27.5	80	7.0	100	25.0	100	0	45
Shiriuchi, Kamiiso district	—	—	—	—	—	—	30.9	68	14.3	21
Tomari, Hiyama district	—	—	—	—	—	—	5.8	86	9.8	92
Kaminokuni, Hiyama district	0	100	16.7	156	14.0	100	12.9	93	0.9	113
Assabe, Hiyama district	0	200	38.4	146	—	—	12.4	113	—	—
Otobe, Nishi district	—	—	—	—	3.0	100	16.0	100	18.0	100
Average	0.44		27.09		6.90		13.86		9.95	

4. *Nesopimpla naranyae* Ashmead [Text-fig. IX]

(Aomushi-hirata-himebachi)

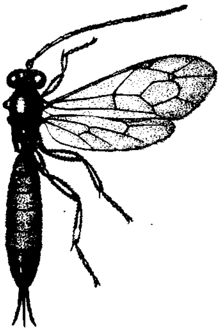
Nesopimpla naranyae Ashmead, Proc. U. S. Nat. Mus., XXX, p. [illegible], Pl. XIII-fig. 3 (1906); Matsumura, Cat. Benef. Ins. Jap., p. 110 (1908); Uchida, Jour. Facul. Agr., Hokkaido Imp. Univ., XXV, p. 48 (1928).

1) On account of wrong identification, a few other species are included in the data.

This species belonging to the tribe Pimplini, subfamily Pimplinae, family Ichneumonidae, is commonly distributed in Japan throughout Hokkaido, Honshu, Shikoku, Kyushu, Okinawa, Taiwan and Chosen.

Morphological Characters of the Adult: [Female] Head and thorax pitchy black. Eyes and ocelli blackish brown; antennae brownish, with narrow blackish annulations, except the blackish scape; palpi yellowish white. Wings hyaline, iridescent; pterostigma black except a yellowish white spot at the base, internal nervures black, costal nervure to the stigma dark yellow. Legs pale yellow; hind coxae behind, middle and hind femora and the apical half of the hind tibia pale ferrugineous; apex of the hind femora, both extremes of the hind tibia, apices of the hind tarsal joints and claws of all legs black. Abdomen pale ferrugineous except apical two segments and the dorsal part of the sixth segment which are black; ovipositor dark red, terebra black.

Head transverse, nearly as wide as the thorax, with fine punctures closely and provided with dense silverly white pubescence; eyes large, elongate, hemispherically raised, with a depression at the inner side; ocelli prominent but rather small, situated nearly in an equilateral triangle. Antennae slender, filiform, slightly longer than the length of the fore wing, about 6.0 mm. in length, 25-jointed, with dense and fine pubescence; basal joint small; scape large, elliptical in shape, one and a half times as long as the width, at the outer side being deeply clefted; pedicel stout, of which length-ratio is 3 : 1 in the outer and inner sides; annellus very short, ring-shaped; funicle-joints provided with many slit-like sensoria, gradually shortening towards the distal joints; first funicle-joint slender, cylindrical, 5.5 times as long as the width; the penultimate nearly equal in length and width; the terminal rather long, twice as long as the width, roundly ended, with 11 short obtuse spines of yellowish colour at the apex. Clypeus rather narrow, anteriorly concave; labrum wide; mouth-part slightly protruded; mandibles somewhat narrow, two-dentated, palpi very slender, with dense white pubescence.



Text-fig. IX
Nesopimpla naranyae ASHMEAD
Female (Ca ×6)

Thorax immaculate, closely punctated, with moderate dense pubescence,

especially on the sides; mesonotum longer than the width, scutellum roundly ended; propodeum with two distinct longitudinal carinae that diverge posteriorly and end just over the insertion of the hind coxae, and without costula; metathoracic spiracles round, sometimes oval. Fore wings elongate, as long as the abdomen and ovipositor combined, with rather dense discal ciliation; pterostigma narrow; areolet large, irregularly pentagonal in shape; recurrent nervure curved and received by the areolet at the middle; nervulus connected with the basal nervure directly at the cubitus. Hind wings rather long. Legs with dense pubescence; hind leg stout and much longer than the fore leg; tibial spurs 1 – 2 – 2, subequal in length, rather short; claws simple and curved, without tooth; first tarsal joint the longest, followed by the fifth and then the second, the fourth being the shortest.

Abdomen subsessile, elongate, depressed, suddenly tapering at the apex; first segment nearly straight, with the spiracles placed before the middle; apices of the second to sixth segments tumid; the third to sixth with each a transverse impression a little behind the middle, impression on the second being distinct only laterally, and interrupted at the middle, lateral impressed lines appeared at the second to fifth segments; all segments strongly punctured and with dense pubescence. Ovipositor and terebra subequal in length, rather short, straight, a little longer than the terminal three segments; ovipositor pointed sharply, terebra with concolorous hairs densely.

[Male] Essentially the same with the female except the secondary sexual characters; the body in general much smaller than in the female.

[Measurements] This species is considerably variable in dimensions. Length of body, 8–10 mm. including ovipositor in the female, 5–6 mm. in the male.

Remarks on the Parasitism: This is a well-known species as an important parasite of the rice leaf-caterpillar (*Naranga aenescens*), and the adult may be frequently seen in the rice-field from June to October. I once caught this Ichneumon-fly emerged from the cocoon of the rice leaf-beetle in the County of Kasai. The fly issued was very small, measuring only 5 mm. in body-length, but it was without doubt this species. From this fact, it may be concluded that *Nesopimpla naranyae* has a habit to attack the rice leaf-beetle from time to time.

5. *Melcha lemae* SONAN

(Taiwan-doromushi-himebachi)

Melcha lemae SONAN, Trans. Nat. Hist. Soc. Formosa, XX, p. 359 (1930).

This Ichneumon-fly belongs to the tribe Mesostenini, subfamily Cryptinae, family Ichneumonidae, and was described by one male specimen which was reared from a cocoon of the rice leaf-beetle at Shirin, near Taihoku, Taiwan. The genus *Melcha* is closely related to the genus *Goryphus*. I have not yet examined this species personally.

6. *Habrocryptus ruficoxatus* SONAN

(Doromushi-onaga-himebachi)

Habrocryptus ruficoxatus SONAN, Trans. Nat. Hist. Soc. Formosa, XX, p. 357 (1930).

This species belongs to the tribe Cryptini, subfamily Cryptinae, family Ichneumonidae. J. SONAN (*117*) described this species on one female specimen reared from a cocoon of the rice leaf-beetle which was collected in Yamaguchi Prefecture by T. SHIRAKI. This seems to be quite rare.

B. Secondary Parasites

1. *Pezomachus lemae* SONAN

(Doromushi-arigata-himebachi)

Pezomachus lemae SONAN, Trans. Nat. Hist. Soc. Formosa, XX, p. 271 (1930).

This Ichneumon-fly belongs to the tribe Pezomachini, subfamily Cryptinae, family Ichneumonidae, and seems to be rare, being only known in Nagano Prefecture at present. As is well known, the members of the tribe Pezomachini are almost secondary parasites. In Japan, T. UCHIDA (*120*) regarded *Pezomachus dendrolimi* MATSUMURA as a secondary parasite of *Dendrolimus albolineatus*, and U. NAWA reported *P. apantelicida* VIERECK[1] as a parasite of "Samurai-yadori" (*Apanteles japonicus*) and a Braconid parasitic on *Dendrolimus spectabilis*. It is also probable that *P. lemae* is a secondary parasite of *Lema oryzae*.

2. *Bathythrix kuwanae* VIERECK [Text-fig. X]

(Doromushi-kuro-himebachi)

Bathythrix kuwanae VIERECK, Proc. U. S. Nat. Mus., XLIII, p. 584 (1912); SONAN, Trans. Nat. Hist. Soc. Formosa, XX, p. 271 (1930).

Batithrix kuwanae SONAN, Trans. Nat. Hist. Soc. Formosa, XX, p. 358 (1930).

Batithrix kuwanae var. *nigrans* SONAN, Trans. Nat. Hist. Soc. Formosa, XX, p. 358 (1930).

Bathythrix sp., OKADA, Yamaguchi Agr. Exp. Sta., Ex. Rep. 3, p. 9, Pl. II-fig. 2 (1913).

Cn. ? sp. ?, Anonymous, Niigata Agr. Exp. Sta., Gaichû Kenkyû Seiseki Hôkoku (Rep. Res. Injur. Ins.), 2, p. 45, Pl. IV (1902); Anonymous, Hokkaido Agr. Exp. Sta, Cir. 20, p. 7, Fig. 6 (1922).

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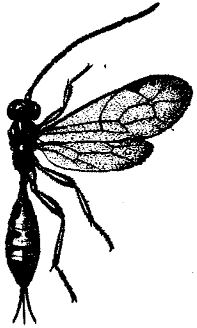
1) According to NAWA, this species is not fully determined. See "Konchû Sekai" (Ins. World), XVIII, p. 94 (1914).

Hemiteles narangae UCHIDA, Jour. Facul. Agr., Hokkaido Imp. Univ., XXV, p. 342 (1930).

This species belongs to the tribe Hemitelini, subfamily Cryptinae, family Ichneumonidae. This is very common throughout Hokkaido, Honshu and Chosen. According to J. SONAN (*116, 117*), this species was captured at Hakodate, Aomori, Akita, Fukushima, Yamanashi, Nagano, Niigata, Ishikawa, Tottori, Shimane, Hiroshima, Yamaguchi and Ryusei (Chosen). T. UCHIDA (*120*) described this species on the specimens from Sapporo.

SONAN (*117*) separated a variety of which the abdomen black and apical margins of the second and third tergites reddish brown, under the name of *nigrans*. As already mentioned by H. L. VIERECK (*121*), this species is closely related to the member of the genus *Hemiteles*.

Morphological Characters of the Adult: [Female] Head and thorax shiny black, covered with silverly white pubescence; eyes blackish brown, ocelli dark yellow; antennae yellowish brown, gradually darkened towards the distal part; mandibles reddish brown, palpi light yellow. Wings hyaline, iridescent; pterostigma and nervures in the distal two-thirds brown, basal parts of the nervures yellowish brown. Fore and middle legs light yellow; hind legs yellowish brown, except light yellowish coxae and trochanters, darkened at the apices of the tibiae and each tarsal joints. The first segment of the abdomen black, shiny; the second and third segments stramineous yellow, each with two black markings on the dorso-lateral side; the fourth blackish at the base; the rest of the abdomen stramineous yellow to light brown, often varying to brownish black; ovipositor light yellow, terebra dark brown.



Text-fig. X
Bathythrix kuwanae VIERECK
Female (Ca ×9)

Head transverse, wider than the thorax, narrowed behind the eyes, polished and shining, with rather dense and long pubescence except at the occipital region; clypeus somewhat square in shape, slightly convex, well defined by the deep clypeal suture; anterior margin straight. Eyes large, elliptical in shape, raised convexedly, bare; ocelli far from the eyes, projected, situated in a small equilateral triangle at the vertex; antennae filiform, slender, a little shorter than the body-length excluding ovipositor, 3 mm. in length, 24-jointed, approached at the base, with rather

dense concolorous pubescence; basal joint almost polished, concolorous with the head; scape large, ovoidal, a little longer than the width; pedicel about two-thirds of the scape, shorter than the width; annellus very short, as wide as the funicle-joints, ring-shaped; funicle-joints cylindrical, gradually tapering towards the terminal joints, with 2 bristles at each apical part except the terminal joint, and provided with many slit-like sensoria; first funicle-joint four times as long as the width; penultimate joint one and a half times as long as the width; terminal joint obtuse conical, a little shorter than three times of the width at its base. Mouth-part not so much protruded; mandibles rather slender, polished; palpi slender, with dense concolorous pubescence.

Thorax longer than wide, polished and shining, with whitish dense pubescence; pronotum narrow; mesonotum with two distinct parallel parapsidal furrows, thus dividing the mesoscutum into three subequal rectangular portions; scutellum rather narrow, subacute at the apex; metathoracic spiracle round; propodeum with distinct carinae; area basalis long and rather narrow; area superomedia large, longer than wide, with a longitudinal carina; area petiolaris pentagonal in shape, rather wide; costula rather long, far beyond the middle. Fore wings hyaline, rather wide, with fine discal ciliation, pterostigma large, triangular in shape; areolet pentagonal, but open behind, the basal nervure not strongly curved inwardly; ramellus vanished, radius acutely curved, the recurrent nervure rather straight, broken at the middle. Hind wings rather short and narrow; nervullus broken at the middle. Legs slender; hind leg larger than the others; tibial spurs 1-2-2, short, the spur of the fore leg being flattened; the hind coxae large, globose, situated far behind the metathorax; the first tarsal joint very large, especially the hind one being a little shorter than the rest of the tarsal joints; claws simple, sharp and curved.

Abdomen petiolate, slender, depressed and broadened distally; postpetiole as long as the petiole, slightly widened posteriorly, with distinct longitudinal carinae, shining, without pubescence, punctured roughly, rest of the abdomen smooth with dense whitish pubescence. Ovipositor rather long, little shorter than a half length of the abdomen, straight, very sharply pointed; terebra nearly as long as the ovipositor, with dense and fine pubescence.

[Male] Resembles the female, but differs in the following points:

Antennae brownish to dark brown; the distal half of the hind femur, the hind tibia, the middle and hind tarsi dark brown; the apical halves of the second and fourth segments coloured triangularly with yellow; the

third yellow with two blackish markings; the rest of the abdomen blackish; colouration of the abdomen considerably variable.

[Measurements] Length of body 4 mm. (or 5 mm. including the ovipositor) in the female, and 4.5 mm. in the male.

Remarks on the Parasitism: As already stated, this species has been found from many localities of Hokkaido, Honshu and Chosen, even where other parasites are not yet discovered, and it is known as one of the most important primary parasites of the rice leaf-beetle. However, the majority of the members of the tribe Hemitelini, at least of the genus *Bathythrix*, were proved as secondary parasites. For example, in his well known paper "A study in Insect Parasitism", L. O. HOWARD (*110*) reported his observations on the parasites of the white marked tussock moth (*Orgyia leucostigma*), and regarded *Bathythrix meteori* as a parasite of *Meteorus communis*, which is a common Braconid parasitic on *Orgyia leucostigma*, and also *Bathythrix pimplae* as a parasite of *Pimpla inquisitor*, which is one of the most important and wide spread parasites of the lepidopterous larvae in the United States; in other words, these two *Bathythrix*-species are the secondary parasites of *Orgyia leucostigma*. Of *B. meteori* he recorded that one specimen issued from a cocoon of *M. communis*, and the other specimens, thirteen in number, issued from a mass of 624 cocoons of the *Orgyia*; he also pointed out the remarkable fact that even a single specimen of *Meteorus* did not emerge from this lot of cocoons.

Now, in the case of *Bathythrix kuwanae*, though its exact host relationships are not yet fully investigated, it may probably be a parasite of Ichneumon-flies, such as *Anilastus japonicus*, parasitic on the rice leaf-beetle. Disposing the same material in the surveys of *Anilastus japonicus* and *Trichomalopsis shirakii* during 1916 to 1920, the Oshima Branch of the Hokkaido Agricultural Experiment Station examined the percentage of the cocoons of the rice leaf-beetle from which *B. kuwanae* issued. Its percentage was 9.75 per cent on the average of five years, being 1.9 per cent lower than that of *A. japonicus*. The data are detailed below:

Table XXXI—*Percentage of the cocoons of the rice leaf-beetle from which Bathythrix kuwanae issued in the Oshima Peninsula*

Year / Percentage / Locality	1916		1917		1918		1919		1920	
	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined	Percentage of parasitised cocoons	Number of cocoons examined
Ôno, Kameda district	% 8.0	200	% 0	115	% 15.0	100	% 7.0	100	% 6.0	100
Nanaii, Kameda district	2.6	38	9.1	33	—	—	16.0	200	—	—
Kameda, Kameda district	3.5	200	5.2	58	—	—	3.6	138	8.2	73
Yunokawa, Kameda district	3.0	100	32.8	58	23.0	161	17.0	100	0.8	118
Kamiiso, Kamiiso district	4.0	100	15.0	133	10.0	120	12.0	100	12.7	102
Kikonai, Kamiiso district	8.5	200	35.0	80	25.0	100	11.0	100	4.4	45
Shiriuchi, Kamiiso district	—	—	—	—	—	—	4.4	68	0	21
Tomari, Hiyama district	—	—	—	—	—	—	1.2	86	4.3	92
Kaminokuni, Hiyama district	4.0	100	13.5	156	12.0	100	2.2	93	2.7	113
Assabe, Hiyama district	8.5	200	10.3	146	—	—	6.2	113	—	—
Otobe, Nishi district	—	—	—	—	0	100	3.0	100	7.0	100
Average	6.06		13.99		14.83		8.35		5.50	

Taking into my consideration HOWARD's studies as well as my own observations, I have come to conclusion that *Bathythrix kuwanae* is a secondary parasite of the rice leaf-beetle. T. UCHIDA (*120*) described this species as a secondary parasite of the rice leaf-caterpillar (*Naranga aenescens*).

3. *Bathythrix rufus* SONAN

(Doromushi-kibara-himebachi)

Bathythrix rufus SONAN, Trans. Nat. Hist. Soc. Formosa, XX, p. 358 (1930).

This species was described recently by J. SONAN (*117*) based on a female specimen from Niigata Prefecture, and it differs from *Bathythrix kuwanae* only in its yellowish brown tergites of first to third. This species seems to be rare. Since I have not yet examined this species personally, I cannot express my own view. However, it is probable that this is also a secondary parasite of the rice leaf-beetle as in the case of *B. kuwanae.*

(2) Predaceous Insects

The rice leaf-beetle is, as in the case of other insects, devoured by a number of predaceous insects belonging to the orders Coleoptera, Diptera, etc. However, I will only discuss on two species of Coleoptera, which occur commonly in the rice-field and attack the leaf-beetle.

1. *Hippodamia tredecimpunctata* LINNÉ [Text-fig. XI]
(Jûsanhoshi-tentô)

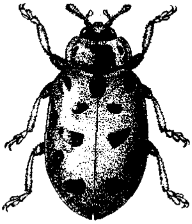
Coccinella tredecimpunctata LINNÉ, Syst. Nat., ed. X, p. 366 (1758).

Hippodamia tredecimpunctata MULSANT, Hist. Nat. Col. Fr. Sécurip., p. 31 (1846); GANGLBAUER, Käfer v. Mitteleur., III, p. 1020 (1899); MATSUMURA, Thous. Ins. Jap., IV, p. 56, Pl. LIX-fig. 31 (1907); OKAMOTO, Hokkaido Agr. Exp. Sta., Bul. 9, p. 9, Pl. II-fig. 7 (1909); TAKIZAWA, Konchû Sekai, XXI, p. 494, 2 figs. (1917); OKAMOTO, Hokkaido Agr. Exp. Sta., Rep. 12, p. 69, Pl. IV-fig. 2 (1921).

This lady-bird belonging to the tribe Coccinellini, subfamily Coccinellinae, family Coccinellidae, is a well known species widely distributed throughout the Northern and Central Europe, Siberia and North America. It occurs abundantly on water-plants. In Japan, this species is known in Hokkaido and Honshu, and devours some kind of aphis, such as *Rhopalosiphum prunifoliae* and *Rhop. nymphaeae* on the rice-plants and arrowhead (*Sagittaria trifolia* var. *sinensis* f. *caerulea*), and also *Macrosiphum granarium*, *Mac. pisi*, *Aphis glycines* and *A. laburni* on the field crops. Nevertheless, as far as I am aware of, predatory habit of this species on the rice leaf-beetle has not yet been reported.

Morphological Characters: [Adult] Oblong, slightly convex, shining; head black except yellowish frons and yellowish brown clypeus, with many fine shallow punctures and sparse whitish pubescence; mouth-part yellowish brown; eyes blackish; antennae yellowish brown, darkened towards the apex, with sparse brownish hairs. Pronotum yellowish, with a broad longitudinal black band and a black spot on each side, punctured as in the head; scutellum blackish, triangular and small, with a few fine punctures;

elytra orange-yellow or yellowish red, with thirteen black spots of various sizes, the arrangement of the spots being $1\frac{1}{2}+2+2+1$, roughly but densely punctured. Sternum black, with a whitish yellow patch on each posterior edge of the meso- and meta-sternum; legs black, but the tibia and tarsi reddish brown with dense pubescence; the ventral side of abdomen black, both sides of each segment, except the terminal one, being orange-red.



Text-fig. XI

Hippodamia tredecimpunctata LINNÉ Adult (Ca ×8)

Length of body 5.8–6.0 mm. in the female, and 4.8–5.9 mm. in the male.

[Egg] Glossy light yellow, spindle-shaped. Length 1.3 mm. and width 0.6 mm. on the average.

[Larva] Elongate, gradually tapering anteriorly and posteriorly, dark reddish green in the ground-colour. Head dark brown, with sparse brownish hairs; frons, clypeus and mouth-part greenish. Pronotum with four blackish longitudinal stripes; meso- and meta-notum each provided with two large blackish patches and a papilla-like blackish projection on each lateral side, the projection having numerous fine processes, whence some short brownish hairs grow; at the middle of notum tinged longitudinally with a yellowish red colour. Legs greenish brown, with dense brownish short hairs; the apical half of femur, the apex of tibia, and the claws blackish. From the first to eighth segments of abdomen it is found six blackish projections transversely arranged on each, and with yellowish green or yellowish brown subdorsal lines; the projection again putting out several small processes which grow a brownish short hair; the first and fourth terga tinged with orange-red colour; the terminal segment fuscous with sparse brownish hairs. Length of the full-grown larva 7.5–8.0 mm.

[Pupa] Ovoidal, yellowish green just after pupating, and changes gradually to brownish colour. Head dark brown, with a greenish longitudinal line; pronotum with two large triangular dark brown spots along the anterior margin and four round concolorous spots along the posterior margin, two dorsal ones of which are smaller than the outer; meso- and meta-notum with two large blackish patches, the wing-portions being dark brown. Abdomen with orange-yellow dorsal and lateral lines, provided with two small black spots on the first tergite, which is almost orange-yellowish coloured; the second and third tergites dark brown. Usually

attached to the larval exuvia. Length of body 6.5 mm.

Life-History and Habits: According to our observations, this lady-bird has two or three generations in one year, and in the adult-stage it passes the winter in shrubs, weeds, crevices of woods, around the house, etc. The adults appear as early as the end of April, accelerating in appearance during June, and they lay their eggs vertically in mass which contains three to thirty on the stems or leaves. The eggs hatch in a week, and the larvae complete their developments within about three to four weeks, and the adults of the next generation appear in August after the pupal stage of five to seven days. Under normal summer-condition the life-cycle from egg to adult is accomplished within a period of approximately a month, and the last emergence takes place at the middle of October. The longevity of the adult is rather long, and during its life it preys upon a great number of aphis and other small insects. According to the feeding records of the adult carried out during 21 days from June 16 to July 6, 1922, the total number of the aphis, *Hyalopterus arundinis*, eaten by one adult was 387, thus giving a daily average of 18.4. I found out also that this lady-bird often devours the onion-thrips (*Thrips tabaci*).

In the rice-field, during June and July, it is very common that the hibernated adult and the larva of the first-generation devour the egg and young larva of the rice leaf-beetle on the rice-plant. Although we have not yet any numerical record, a large number of eggs of the leaf-beetle is fed by them. This lady-bird is by far the most important member as regards the control of the rice leaf-beetle by natural means.

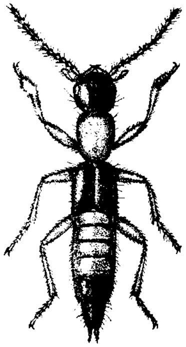
2. *Paederus idae* LEWIS [Text-fig. XII]

(Aoba-arigata-hanekakushi)

Paederus idae LEWIS, Trans. Ent. Soc. Lond., 1874, p. 75 (1874); MATSUMURA, Thous. Ins. Jap., III, p. 34, Pl. XL-fig. 19 (1906); SHIRAKI, Agr. Exp. Sta., Gov. Formosa, Sp. Rep. 15, p. 158, Pl. XI-fig. 6 (1917).

This beetle belongs to the tribe Paederini, subfamily Paederinae, family Staphylinidae, and is distributed in Hokkaido, Honshu, Kyushu and Taiwan. According to SHIRAKI (*115*), it extends also to China.

Morphological Characters: [Adult] Slender, sowewhat flat, and shiny. Head black, as long as wide, with sparse long brownish hairs, and punctured deeply but sparingly; mouth-part yellowish brown to reddish brown, well developed; clypeus sparsely furnished with long brownish setal hairs; eyes brownish black; antennae slender, prominently jointed, brownish except four basal joints which are yellowish brown, sparsely pubescent, and with a



Text-fig. XII

Paederus idae LEWIS
Adult (Ca ×8.5)

few setae near the apex of each joint. Pronotum ovate, as broad as the head, reddish, with sparse hairs, punctured distinctly but sparingly; scutellum very small, yellowish brown, somewhat roundish. Elytra cyaneous or metallic dark blue, short but distinctly longer than the pronotum, rectangular, with dense and deep punctures, furnished with sparse hairs. Legs reddish, with dense concolorous pubescence, darkened at each apex of the femora and tarsal joints. Abdomen not concealed under elytra, reddish in colour and sparsely pilose, except two terminal segments which are blackish and with dense hairs; the punctation distinct but sparse; pygidium long. Length of body 6.0-7.0 mm.

Life-History and Habits: This small beetle was reported by T. SHIRAKI (*115*) as an important predacean to the rice borer (*Schoenobius incertellus*) in Taiwan, since the adult had been repeatedly observed feeding on the larvae of *Schoenobius incertellus* in all stages. In Hokkaido, this beetle is especially abundant around the rice-fields in spring from May to June; it often crawls on the stem of rice-plant. This species is also found under stones or fallen trees or rubbish in the foot-path between rice-fields. I often observed the adult of this beetle preying upon the larvae or eggs of the rice leaf-beetle on the rice-plant. This beetle is probably one of the most effective predaceous enemies against the rice leaf-beetle. Since this beetle resembles the rice leaf-beetle in appearance, farmers often confound these beetles. The complete life-history is not yet fully known.

IX. SUGGESTIONS ON THE CONTROLLING MEASURES

Discussion on the controlling measures may not be proper for this paper. However, I wish to make a suggestion from my own personal studies. For a long time various controlling measures against the rice leaf-beetle have been devised and tried in the field. It is the same now as in old times, that, when the ravages by this leaf-beetle are great, many ignorant farmers resort to an amulet against the calamities, but only in vain. As stated before, as this leaf-beetle hibernates in the places other

than in the rice-field, it is very difficult to control it thoroughly. And we are only left to do our best in controlling the leaf-beetle during its activity in the rice-field.

As this leaf-beetle habitually deposits the eggs in mass on the upper surface of the rice-leaves, the collection of the egg-masses will be one of the controlling measures that can be put into practice. When the egg-parasites are found, their protection should jealously be done by the use of the so-called protecting apparatus of natural enemies, as in the case of the rice borers, namely *Chilo simplex* and *Schoenobius incertellus*. On the other hand, application of the poisons such as nicotine, rotenone, pyrethrins, etc., to prevent the hatching of the eggs, is another problem to be solved in the near future.

The habit of the adults and larvae to feed on the upper surface of the leaves makes it convenient to practice the controlling measures. For many years, the method to brush this pest off the rice-plant immediately after the use of some kind of oils has been recommended. Recently the brushing off with a net has also been recommended. For example, a boat-shaped net originally designed by a member of our Experiment Station is generally used by the farmers in Hokkaido [see Text-fig. XIII]. Though this apparatus is still open to improvement, the use of this net is less expensive than the methods such as the use of oils, etc. From the ecological point of view the brushing by net in the early morning may be most effective, as on account of dew-drops the adults are inactive and the larvae are more easily stick to net.

Text-fig. XIII

A boat-shaped net used in Hokkaido for the brushing off the rice leaf-beetle. (Ca × 1/14)

Sprayings are also recommended. The contact poisons or stomach-poisons have not yet been fully determined. However, the application of stomach-poisons retards sometimes the growth of the rice-plant, though the degree of injury varies greatly according to the poisons used and the time of the growth of the plant. From the ecological habits of larva we may reasonably expect an effective result by the application of contact poisons, such as pyrethrum-soap-solution, naphtha-pyrethrum-emulsion, nicotine-sulphate-soap-solution, derris-soap-solution, Neoton-soap-solution, etc. In Hokkaido the pyrethrum-

soap-solution is mostly used by the farmers on account of its easy application as well as its lower cost. There is, however, much room for future research on the insecticides against the rice leaf-beetle. Though some farmers still use simple and incomplete sprayers at present, a more improved machinery such as the compressed air sprayers or knapsack sprayers, are desirable for the purpose of more effective spraying.

No treatment against the pupal stage can be recommended at the present time, especially in view of the protection of the natural enemies discussed in the foregoing chapter.

In closing this chapter, I should like to state, based on the ecological experiments discussed in the foregoing pages, that the food-plant of the rice leaf-beetle is limited absolutely to the rice-plant, so that this leaf-beetle does not seem to make any sudden alteration of the host-plants from the rice-plant to the other cereals, such as wheat, barley, oats, etc., even though the artificial eradication against this leaf-beetle is boldly attempted in the rice-field.

X. SUMMARY

1. The rice leaf-beetle, or "Doro-oi-mushi", "Ine-doro-hamushi", etc. in the Japanese vernacular, is one of the most serious pests among one hundred and seventy species of the injurious insects to the rice-culture.

2. Since N. ÔKURA recorded this pest briefly as early as 1826, intensive studies have been done for many years by various students, but much room has been left for research, especially on its identification, its generations, its ecological habits, its natural enemies, its distribution, etc. So I have made a thorough study of this pest since 1922, and in the present paper I have endeavoured to report the results of my investigations on the external morphology, some phases of ecology, taxonomy, distribution, natural enemies, etc.

3. The rice leaf-beetle has hitherto been referred to as *Lema melanopa* LINNÉ, and formerly known as *L. tristis* HERBST (=*L. flavipes* SUFFRIAN). After my studies, however, I have found out that it is not only distinct from these related species, but also even undescribed. To that I gave the name *Lema oryzae* and described it briefly in March, 1931.

4. A brief diagnosis of the adult is as follows: General colour of the body blackish, with the pronotum bright yellowish brown and the elytra metallic blue. Antennae black and with dense grayish pubescence, except two basal joints, which are dark brown and scarcely pubescent.

Legs bright brownish yellow, with blackish coxae and dark brownish tarsi, the tibiae being darkened at the apices; abdominal sternites deep black, with close and fine punctures, covered with dense grayish yellow pubescence. The average length of body 4.23 mm. in the male and 4.76 mm. in the female.

5. In form and colouration of the adult, this species can easily be separated from *Lema tristis* Herbst by the prothorax bright yellowish brown, and from *L. melanopa* Linné by the size smaller, basal two joints of antennae dark brownish, the trochanters brownish yellow, the tarsi and apices of tibiae dark brownish, the abdominal sternites blackish, and also by the close punctures and dense pubescence of the abdominal sternites and the longer claws of legs.

In detail, the thickness of elytra, the colour of the interjoint-membrane of antennae and the intersternal membrane of abdominal sternites, as well as the colour and the shape of the male genitalia (penis) are also stable features to separate *L. oryzae* from *L. melanopa*.

6. The egg of this leaf-beetle is elongate ovoid in shape, measuring 0.807 mm. in length. It differs very much from the egg of *L. melanopa* which is cylindrical and measured 1.092 mm. in length. The full-grown larva of this beetle has the prothoracal shield scattered with many dark brownish spots, while that of *L. melanopa* has the prothoracal shield provided with a few brownish spots which restricted along the posterior area.

7. According to my measurements the lengths and widths of the adult, egg, larva, pupa and cocoon vary considerably among individuals, and the range between the maximum and minimum is quite wide. The size of the female is much larger than that of the opposite sex. The secondary sexual character in the dimensions appears by the pupal stage, the pupa to be transferred into the female being much larger and more elongate than that into the male.

8. A survey of the literature indicates that the life-history differs in various localities in Japan. However, according to my researches, the annual generation of this leaf-beetle is apparently constant in any locality where climatic complexes differ, from Hokkaido in the north to Taiwan in the south, as well as in Chosen. By my observations, the life-cycle of this leaf-beetle is briefly as follows: There is only one generation per year, and over-wintering takes place in the adult-stage. The adult-beetle leaves the hibernated place as early as the latter part of May, and it mates and commences to oviposit early in June. Oviposition continues long towards the end of July. The adults sprung from the earlier oviposition,

commence to emerge from the end of July and continue to do so until the end of August. Then the adults bury themselves in the debris at the *adjacent mountain-bush, under the roots of grasses in the wind-break,* etc. In Taiwan, the life-cycle is advanced by about three months than the above-mentioned conditions.

9. The life of adult is a long one. It lives for one year or more; the newly emerged beetle feeds freely on the rice-plant before its hibernation; then it rests for a long time through three quarters of a year, from summer to winter. This phenomenon may be owing to the fact that the sexual glands of this beetle require a longer time for ripening or to proceed to an efficient copulation after emergence. A male and a female copulate repeatedly during their life in spring. The female deposits her eggs in mass especially on the upper surface of the rice-leaves, representing over 95 per cent in our case. On my observations, one female in confinement deposited about fifty eggs, distributing in about ten egg-masses, during the oviposition-period of fifteen days on an average.

10. The higher temperature has a tendency to help the acceleration of the incubation-period of egg. According to my experiments, under 21.°5 C the incubation-period lasts 5 days, while under 16.°1 C it is prolonged to 11 days. Number of eggs in one egg-mass varies considerably among the masses, being ranged from 1 to 46 eggs, mostly from 3 to 12 eggs, in our case. According to my examinations on 2000 egg-masses in 1929 and 439 egg-masses in 1930, the variation represents an asymmetrical curve of moderately distributed type, the maximum frequency being attained at the 7 eggs-class.

11. One of the most remarkable habits of the larva is to cover the body dorsad with dark greenish excreta during the greater part of its active life. The larva in this condition is at a glance mistaken as if a piece of mud had stuck to the rice-leaf. The larva occupies for its growth thirteen to nineteen days under natural conditions. During its growth, *the larva has invariably three moults making four instars.* The average width of the head of the fourth instar is about 2.5 times of that of the first, while the average body-length of the fourth instar is about 4.2 times of that of the first.

12. This leaf-beetle pupates usually on the rice-leaves, while it puptes also on or under the ground. The latter frequently occurs in the case of upland rice-field. According to my own experiments in this latter case, the cocoons are mostly formed on the surface of ground; about a half of total individuals is formed on the surface of ground, while about one-third

on the leaves. When the cocoons are formed in the soil, the majority of them domicile at the depth less than 3 cm. The cocoon of the rice leaf-beetle is whitish, ellipsoidal, compact though fragile in texture. Even in the case of the cocoons formed on or under the ground, they are not always constructed with soil-particles. The formation of the cocoon of *Lema oryzae* is entirely different from those of *L. melanopa*, but it has a great resemblance to that of *L. cyanella*.

13. The feedings by both the adult and larva are similarly effected by the removal of parallel longitudinal stripes from the leaves, leaving the sclerenchyma around the vascular bundle, the epidermis of lower surface being left intact.

14. As far as is known at present, the rice-plant (*Oryza sativa*) is the only representative staple food-plant of the rice leaf-beetle. While, the resurgent adult in spring occasionally finds some nutriments in certain Gramineous plants other than the rice-plant, especially when the rice-plant has not yet come to growth. However, there is no such a food-plant for the larva. According to my repeated and careful feeding experiments with the rice-plant, oats, barley, naked barley, wheat, rye, Orchard grass and Timothy, the first mentioned plant is the only favourite food-plant for the adult and larva of this leaf-beetle. When the adult is prevented to feed on the rice-leaves, it can find some nutriments in any cereal and grass above mentioned, but the larva in the similar case can not find any nutriment at all, and within from three to five days it starves to death. When the adult is forced to feed on the Gramineous plants other than the rice-plant, its life is shortened and the oviposition-capacity is much reduced. In regard to this phase, the rice leaf-beetle has a different habit from *Lema melanopa*.

15. The rice-plant infested severely withers at no time, and even in the case of slight infestation the rice-plant is doomed to the slow growth. This evil is more conspicuous in the northern parts where the duration of the growth of the rice-plant is shorter.

16. For the sake of comparison, I examined the specimens of the genus *Lema* to the number of nineteen valid species and three varieties inhabiting in the whole Empire of Japan including Karafuto, Taiwan and Chosen. Some of the already known species were revised or struck out into synonyms, while one species and three varieties were newly elected and described in this paper. The new species and varieties are as follows:

Lema formosana KUWAYAMA

Lema concinnipennis BALY var. *ventralis* KUWAYAMA

Lema diversa BALY var. *doii* KUWAYAMA

Lema decempunctata japonica WEISE var. *brunneipennis* KUWAYAMA

I also presented a key to distinguish the Japanese species of the genus *Lema*.

17. In the Palaearctic region, as far as I am aware of, five species of the genus *Lema* are known at present as infesting the Gramineous plants. These species have some ecological habits common to all of them. However, the selection of food-plants and the pupating habits of these species are different. We should consider these ecological characters when we make a classification.

18. The rice leaf-beetle is widely distributed in Japan throughout Hokkaido, Honshu, Shikoku, Kyushu, Chosen and Taiwan, extending from about $22^{\circ}.5$ to about 44° in the north latitude and within about 121° and 144° in the east longitude at present. It is noticeable that the infestation by this leaf-beetle is severer around the coast of the Sea of Japan (except Taiwan) than in the Pacific Sea-board of Japan. The original home is not yet fully determined in this paper, but it is supposed to be the coast of the Sea of Japan in Honshu, somewhere in the localities between Yamagata and Ishikawa Prefectures.

19. Up to present, nine species and one variety of parasites of the rice leaf-beetle are known. Among them, a Mymarid-fly heretofore known as *Anaphes* sp. or *Polynema* sp., is an important egg-parasite distributed in Hokkaido and Honshu. According to my studies, it is an apparently undescribed species; so I named it in this paper *Anaphes nipponicus*. As a result of my repeated experiments it may well be said that when the parasitised egg-masses of the leaf-beetle are transported and protected by the use of the egg-parasite-protecting apparatus, this egg-parasite is able to settle easily in the locality heretofore uninhabited by it in Hokkaido. The maximum percentage of the parasitism by this egg-parasite observed in 1929 and 1930, was 51.5 per cent during the end of July at Kagura, County of Kamikawa. The other members are parasitic on the larva of the rice leaf-beetle. However it is probable that *Pezomachus lemae* SONAN, *Bathythrix kuwanae* VIERECK, *B. kuwanae* var. *nigrans* SONAN and *B. rufus* SONAN, all belonging to the Cryptinae of Ichneumonidae, may be the secondary parasites of the rice leaf-beetle. *B. kuwanae* is one of the most common species in Hokkaido, Honshu and Chosen. According to the surveys of the Oshima Branch of the Hokkaido Agricultural Experiment Station, the percentage of the cocoons of the rice

leaf-beetle from which this parasite issued was 9.75 per cent on the average during 1916 to 1920 in the Oshima Peninsula. As the primary parasites, we can enumerate five species, namely *Trichomalopsis shirakii* CRAWFORD of Pteromalidae, *Anilastus japonicus* SONAN, *Nesopimpla naranyae* ASHMEAD, *Melcha lemae* SONAN and *Habrocryptus ruficoxatus* SONAN of Ichneumonidae. *Trichomalopsis shirakii* is a widely distributed species in Hokkaido, Honshu and Taiwan. According to the surveys of the Oshima Branch during 1916 to 1920, the percentage of the parasitism of this Chalcid-fly to the cocoons of the rice leaf-beetle was 11.26 per cent in the Oshima Peninsula. *Anilastus japonicus* is also common in Hokkaido and Honshu. According to the surveys of the Oshima Branch disposed with the same material above mentioned, the percentage of the cocoons of the rice leaf-beetle from which this Ichneumon-fly appeared was 11.65 per cent on an average. *Nesopimpla naranyae*, which is one of the most important parasites of the rice leaf-caterpillar (*Naranga aenescens*), was observed by me to issue from the cocoon of the rice leaf-beetle. Among the predaceous insects, two species of Coleoptera, namely *Hippodamia tredecimpunctata* LINNÉ of Coccinellidae and *Paederus idae* LEWIS of Staphylinidae, are the most important, as the adults of both species habitually devour the egg or young larva of the rice leaf-beetle.

20. Based on the observations stated in the foregoing pages, the following controlling measures are recommended: (a) The collection of adults and larvae in the early morning by sweeping the rice-leaves with boat-shaped net during its active time, (b) a thorough spraying with contact poisons such as pyrethrum-soap-solution, naphtha-soap-solution, etc., (c) the collecticn of egg-masses and (d) the protection of egg-parasite by the use of the egg-parasite-protecting apparatus.

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EXPLANATION OF PLATE I

1. Head of *Lema oryzae*, dorsal aspect. [Ca × 22]

2. Mouth-part of *Lema oryzae*, dorsal aspect. [Ca × 75]

3. Ditto, ventral aspect. [Ca × 75]

4. Head of *Lema melanopa*, dorsal aspect. [Ca × 22]

5. A part of prothorax and mesoscutellum of *Lema oryzae*. [Ca × 22]

6. Metasternum of *Lema oryzae*. [Ca × 22]

7. Elytron of *Lema oryzae*. [Ca × 22]

8. Elytron of *Lema melanopa*. [Ca × 22]

9. Abdominal tergites of *Lema oryzae*. [Ca × 22]

10. Metanotum of *Lema oryzae*. [Ca × 22]

11. Hind wing of *Lema oryzae*. [Ca × 17.5]

12. Abdominal sternites of *Lema oryzae* (male). [Ca × 22]

13. Ditto (female). [Ca × 21]

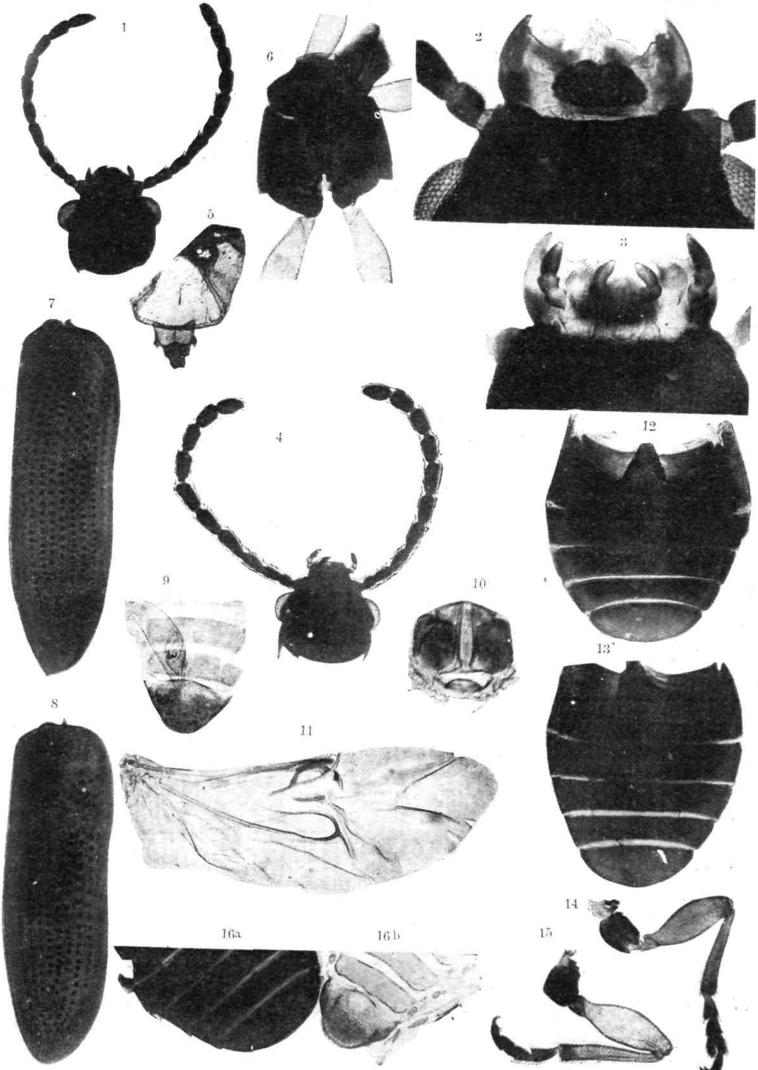
14. Middle leg of *Lema oryzae*, lateral aspect. [Ca × 21]

15. Middle leg of *Lema melanopa*, lateral aspect. [Ca × 21]

16a. Abdominal sternites of *Lema melanopa*. } [Ca × 21]

16b. Abdominal tergites of ditto. }

Plate I



S. KUWAYAMA & K. FUJITA photo

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113. OKAMOTO, H.: Gaiekichû Shiiku Shiken Seiseki (Life-histories of Injurious and Beneficial Insects in Hokkaido). [Hokkaido Agr. Exp. Sta., Hôkoku (Report), No. 12]. (Reference on pp. 69–72, Pl. IV–fig. 2) 1921

114. SCHMIEDEKNECHT, O.: Die Hymenopteren Mitteleuropas. 1907

115. SHIRAKI, T. : Paddy Borer, *Schoenobius incertellus* Wlk. [Agr. Exp. Sta., Gov. Formosa, Tokubetsu Hôkoku (Special Report), No. 15] 1917

116. SONAN, J. : A few Host-known Ichneumonidae found in Japan and Formosa (Hym.). [Trans. Nat. Hist. Soc. Formosa, Vol. XX, pp. 268–273] 1930

117. ——— : Some new Species of Hymenoptera in Japanese Empire, with two known Species. [Trans. Nat. Hist. Soc. Formosa, Vol. XX, pp. 355–360] 1930

118. TAKIZAWA, Masumi: Nippon-san Zoku *Hippodamia* ni tsuite (On the Genus *Hippodamia* of Japan). [Konchû Sekai (Ins. World), Vol. XXI, pp. 494–497, 2 figs.] 1917

119. UCHIDA, T. : Dritter Beitrag zur Ichneumoniden-Fauna Japans. [Jour. Facul. Agr., Hokkaido Imp. Univ., Vol. XXV, pp. 1–115, Pls. I–III] 1928

120. ——— : Fünfter Beitrag zur Ichneumoniden-Fauna Japans (Cryptinae). [Jour. Facul. Agr., Hokkaido Imp. Univ., Vol. XXV, pp. 299–347, Pl. VI] 1930

121. VIERECK, H. L.: Contributions to our Knowledge of Bees and Ichneumonflies, including the Descriptions of twenty-one New Genera and fifty-seven New Species of Ichneumonflies. [Proc. U. S. Nat. Mus., Vol. XLIII] 1912

122. Niigata Agricultural Experiment Station: Gaichû Kenkyû Seiseki Hôkoku (Report on the Researches of Injurious Insects). No. 2. (Reference on pp. 45–47, Pl. IV) 1902

Postscript

On the eve of publication of my manuscript, I have received from Dr. Y. MIWA his paper entitled "A Systematic Catalogue of Formosan Coleoptera" published under the date of October, 1931. He recognized the following 8 *Lema*-species as occurring in Taiwan.

p. 184	*L. rufotestacea* CLARK	Musha, Taitô, Kôshun.
	L. unicolor CLARK	Taihoku, Horisha.
	L. fortunei BALY	Arisan, Kôshun.
	L. oryzae KUWAYAMA	Taihoku.
	L. coronata BALY	Musha, Taitô.
	L. honorata BALY	Nantô, Shôkwa.
p. 185	*L. postrema* BATES	Taihoku.
p. 313	*L. lewisi* BALY	Formosa ?

To my regret, no specimens of *L. rufotestacea* and *L. unicolor* have not appeared to my examination. I have not yet examined also any specimen of *L. coronata* and *L. honorata* from Taiwan. *L. postrema* should be, I think, synonymous with *L. fortunei*, and *L. lewisi* which was listed with some doubt, probably be *L. formosana* of mine.

EXPLANATION OF PLATE II

1. Female genitalia of *Lema oryzae*, dorsal aspect. [Ca x 22]

2. Male genitalia of *Lema oryzae*, lateral aspect. [Ca x 21]

3. Male genitalia of *Lema melanopa*, lateral aspect. [Ca x 22]

4a. Egg of *Lema oryzae*, lateral aspect. } [Ca x 21]

4b. Egg of *Lema melanopa*, lateral aspect. }

5. Egg-mass of *Lema oryzae* in situ on the rice-leaf, white stripe on the leaf being the mark by the feeding of adult-beetle. [Ca x 16]

6. Head and thorax of the larva of *Lema oryzae*, lateral aspect. [Ca x 21]

7. Mouth-part of the larva of *Lema oryzae*, ventral aspect. [Ca x 70]

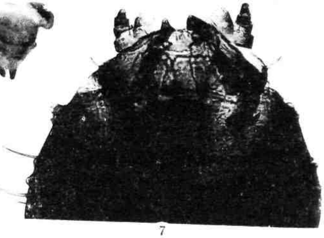
8. Integument of the larva of *Lema oryzae*, showing the spiracles. [Ca x 70]

9. Abdominal sternites and intersternal membrane of *Lema oryzae*. [Ca x 75]

10. Abdominal sternites and intersternal membrane of *Lema melanopa*. [Ca x 75]

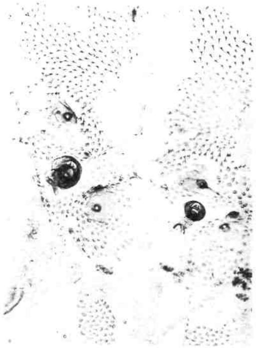
Plate II

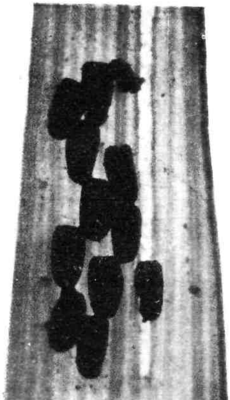
1


7

6

2





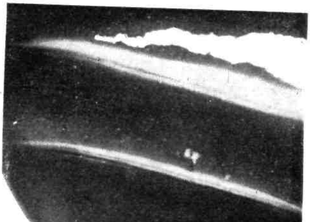
4b

4a

8

3

5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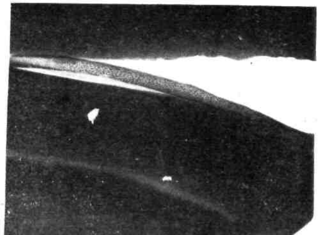

10

S. KUWAYAMA & K. FUJITA photo

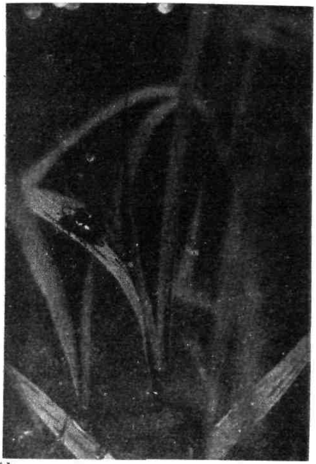
EXPLANATION OF PLATE III

1. Adults of *Lema oryzae* on the rice-leaf, showing their feeding marks. [Ca × 1.8]

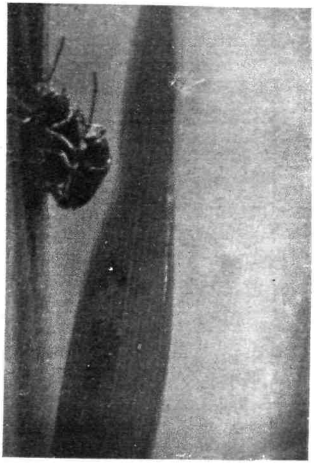
2. Mating of the adults of *Lema oryzae* and the egg-masses on the rice-leaf. [Ca × 4.4]

3. Larva of *Lema oryzae* on the rice-leaf, showing their feeding marks. [Ca × 1]

4. Cocoon of *Lema oryzae* on the rice-leaf. [Ca × 3]



1



2

3

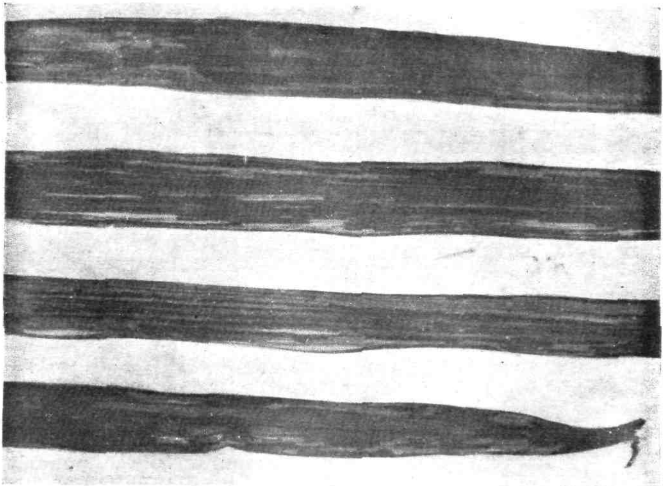
4

S. KUWAYAMA photo

EXPLANATION OF PLATE IV

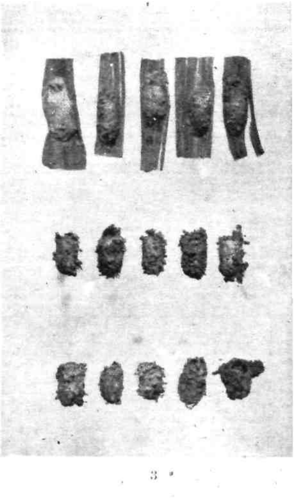
1. Rice-leaves showing typical injury by the larva of *Lema oryzae*. [Ca × 1.8]
2. Situation of the cocoon of *Lema oryzae* on the ground in the case of upland rice-field. [Ca × 2]
3. Cocoons of *Lema oryzae*. [Ca × 2]

Upper	Cocoons on the rice-leaves.
Middle	Cocoons on the ground.
Lower	Cocoons under the ground.



1

2



3

S. KUWAYAMA photo

H. SAUTER'S FORMOSA-AUSBEUTE
ICHNEUMONIDAE (*Hym.*)

VON

TOICHI UCHIDA

(Mit 20 Figuren)

Eine grosse Anzahl Ichneumoniden-Arten aus H. SAUTER's Formosa-Ausbeute sind mir von Herrn Dr. W. HORN, dem Direktor des deutschen entomologischen Museums zu Berlin-Dahlem, zugeschickt worden, in der Aufforderung ihre wissenschaftlichen Namen zu bestimmen. Dieser ehrenvolle Auftrag gab mir vortreffliche Gelegenheit, diese wertvollen Materialien zu studieren.

Zur Einführung möchte ich kurz die Geschichte der systematischen Untersuchung der Ichneumoniden in Formosa darstellen.

S. MATSUMURA: Hat im Jahre 1912 in seiner klassischen Arbeit „Thous. Ins. Jap. Suppl. IV" die Beschreibung der 10 folgenden neuen Arten aus Formosa veröffentlicht:

Ichneumon horishanus MATS. = *Protichneumon horishanus* MATS.
I. taichuensis MATS. = *P. taichuensis* MATS.
I. hopponis MATS. = *Coelichneumon hopponis* MATS.
Platylabus takanonis MATS. = *Dimaetha tibialis* CAM.
Ophion semiopacus MATS. = *Henicospilus semiopacus* MATS.
Paniscus formosanus MATS. = *Paniscus ocellaris* THOMS.
Mesostenus shinshanus MATS. = *Ceratocryptus bituberculatus* CAM.
Glyptogaster formosanus MATS. = *Camptotypus rugosus* DE GEER.
Psilomastax formosanus MATS. = *Trogus matsumurai* nom. nov.
Exephanes akonis MATS. = *Ischnojoppa luteator* F.

Von diesen Arten wurde *Exephanes akonis* von mir in meiner Arbeit „Erst. Beit. Ich.-Faun. Jap. 1926" irrtümlich als *Atanyjoppa akonis* determiniert, sie ist aber identisch mit *Ischnojoppa luteator* F.; weiter habe ich in „Beit. Kennt. Crypt.-Faun. Formosas, 1931" *Mesontenus shinshanus* als *Lactolus shinshanus* erwähnt, die Art scheint mir jedoch ein Synonym von *Ceratocryptus bituberculatus* CAM. zu sein. Die Gattung *Psilomastax* TISCHB. ist ein Synonym von *Dinotomus* FÖRST., die letzter wurde von H. L. VIERECK im Jahre 1914 in „Type Species of the Genera of Ichneumon Flies, p. 46" als ein Synonym von *Trogus* PANZ. behandelt, weil der Gattungs-

[Jour. Facul. Agr., Hokkaido Imp. Univ., Sapporo, Vol. XXXIII, pt. 2, Oct., 1932]

name von *Psilomastax formosanus* MATS. in *Trogus* verändert werden muss. Da aber dieser Artname (*Trogus formosanus*) bereits im Jahre 1926 von mir für eine andere Art benutzt wurde, habe ich hier dafür einen neuen Namen „*matsumurai*" eingeführt.

G. ENDERLEIN: In „Stett. Ent. Zeitg., Jahrg. 73, pp. 105–145, 1912" wurde eine neue Gattung *Sauterellus* nebst einer neuen Art, *Sauterellus planiscutellatus*, von ihm beschrieben, aber in „Proc. U. S. Nat. Mus., Vol. 64, p. 6, 1924" hat R. A. CUSHMAN diese neue Gattung *Sauterellus* in *Leptobatopsis*, einer Gattung der Tribus Lissonotini der Unterfamilie Pimplinae, als ein Synonym eingeschaltet. Noch später, im Jahre 1921 hat G. ENDERLEIN in der gleichen Zeitschrift, Jahrg. 82, pp. 1–45 eine neue Gattung *Gongropelma* und 6 neue Ophioninen-Arten, nämlich *Gongropelma formosanum*, *Agrypon gratiosum*, *Henicospilus tristrigatus*, *H. Sauteri*, *H. emacescens*, *H. formosanus* und *H. laqueatus*, bestgestellt.

C. MORLEY: Vier noch nicht bekannte Arten, eine noch nicht bekannte und eine neue Varietät, welche A. E. WILEMAN in Formosa gesammelt hatte, wurden von MORLEY enumeriert. Sie heissen wie folgt:

Henicospilus lineatus CAM. (Rev. Ichn., I, p. 47, 1912)
Paniscus testaceus GRAV. var. *opaculus* THOMS. (l. c., II, p. 122, 1913)=*Paniscus ocellaris* THOMS.
P. gracilipes THOMS. var. *formosus* MORL. (l. c., II, p. 122, 1913)=*P. gracilipes* THOMS. f. *smithi* D. T.
Heteropelma fulvitarse CAM. (l. c., II, p. 70, 1913)
Theronia zebroides KRIEG. (l. c., III, p. 144, 1914)
Dinotomus pictus KRIECHB. (l. c., IV, p. 64, 1915) =*Trogus pictus* KRIECHB.

Nach MORLEY ist *Ophion unicolor*, welches F. SMITH in „Trans. Ent. Soc. Lond., p. 307, ♂ (non ♀) 1874" aus Japan stammend diagnostiziert hat, eine Varietät von *Paniscus gracilipes* THOMS.; er hat ihm den neuen Namen „*formosus*" gegeben, weil „*unicolor*" bereits für eine andere Art von dieser Gattung benutzt worden war. Da aber *Ophion unicolor* von DALLA TORRE im Jahre 1901 zu *O. smithi* verändert worden war, habe ich hier wie oben erwähnt verbessert; *Ophion smithi*, das von mir in meinem „Zweit. Beit. Kennt. Ichn.-Faun. Jap., p. 211, 1928" enumeriert wurde, ist nichts anderes als *O. luteus* L. Im Jahre 1913 hat C. MORLEY in „Faun. Brit. Ind., Hym. Vol. III, Ichn. I" zwei noch nicht bekannte Arten, *Xanthopimpla punctata* F. und *Stauropodoctonus orientalis* MORL. und eine schon bekannte Art, *Hetropelma fulvitarse* CAM., beschrieben.

H. L. VIERECK: Hat 2 neue Gattungen, *Eripternimorpha* und *Za-*

paraphylax, nebst 2 neuen Arten, *Eripternimorpha schoenobii* und *Zaparaphylax perinae*, bekanntgemacht; die eine Gattung *Eripternimorpha* wurde jedoch von J. SONAN im Jahre 1929 als ein Synonym von *Amauromorpha* ASH. festgestellt.

M. ISHIDA: Die 3 folgenden neuen Arten wurden von ihm in „Kansho-Meichu Chosa-Hokoku, 1914" zum erstenmal beschrieben:

Anomalon lineatum ISHIDA = *Diocles lineatus* ISHIDA
Exetastes longicornis ISHIDA = *Goryphus longicornis* ISHIDA
Phygadeuon punctator ISHIDA = *Xanthopimpla punctata* F.

R. KRIEGER: Hat in diesem Jahre in „Arch. Naturges., Jahrg. 80, Hft. 6–7, pp. 1–152" 11 neue, 3 noch nicht bekannte und eine schon bekannte Art von *Xanthopimpla*, welche H. SAUTER in Formosa gesammelt hatte, diagnostiziert, nämlich *X. imperfecta*, *X. ischnoceros*, *X. aequabilis*, *X. Sauteri*, *X. alternans*, *X. erythroceros*, *X. detruncata*, *X. brachyparea*, *X. brachycentra*, *X. clavata*, *X. formosensis*, *X. fasciata* KRIEG., *X. stemmator* THUNB., *X. emaculata* SZÉPL. und *X. punctata* F., wovon *X. formosensis* mir ein Synonym von *X. iaponica* KRIEG. zu sein scheint.

V. SZÉPLIGETI: Zwei neue Arten, *Xorides rufithorax* und *Acherocephalus pilosus*, wurden von SZÉPLIGETI in „Ann. Mus. Nat. Hung., Vol. 12, pp. 414–424, 1914" veröffentlicht, die Gattung des letzteren wurde aber von mir im „Drit. Beit. Kennt. Ichn.-Faun. Jap., p. 14, 1928" zu einer neuen Gattung „*Formoxorides*" verändert. Noch später, im Jahre 1916 hat er eine neue Gattung, *Pseudomansa*, und die 13 folgenden neuen Arten der Unterfamilie Cryptinae in der gleichen Zeitschrift, Vol. XIV, pp. 225–380, beschrieben:

Pseudomansa SZÉPL. = *Mansa* TOSQ.
Pseudomansa minor SZÉPL. = *Mansa latiscutis* CAM.
Polyaenus striatus SZÉPL. = *Ceratocryptus bituberculatus* CAM.
Neomesostenus formosanus SZÉP.
= *Mesostenus* (*Formostenus*) *szépligeti* UCH.
Stenarella pilosa SZÉPL. = *Mesostenus* (*Mesostenus*) *pilosus* SZÉPL.
Stenaraeus ruficoxis SZÉPL. = *Goryphus* (?) *ruficoxis* SZÉPL.
S. rufipes SZÉPL.
= *Stenaraeoides* (gen. von.) *rufipes* SZÉPL. (♀)
S. formosanus SZÉPL. = *S. rufipes* SZÉPL. (♂)
Mesostenus formosanus SZÉPL. = *Goryphus formosanus* SZÉPL.
M. albosignatus SZÉPL.
= *Mesostenus* (*Mesostenus*) *albosignatus* SZÉPL.
M. opacus SZÉPL. = *Goryphus opacus* SZÉPL.

Mesostenus transiens SZÉPL.=*Goryphus longicornis* ISHIDA
M. ultimus SZÉPL.=*G. ultimus* SZÉPL.

Von diesen Arten habe ich in vorliegender Arbeit *Polyaenus striatus* als synonym zu *Ceratocryptus bituberculatus* CAM. angenommen.

T. SHIRAKI: Hat in „Ext. Rep. Agr. Exp. Stat. Formosa, No. 15, pp. 141–148, 1917" eine schon bekannte Art, *Eripternimorpha schoenobii* VIER., und 2 neue Arten, *Eripternus* (?) *akoensis* und *Trathala* (?) *flavopedes*, welche in der Larve von *Schoenobius insertellus* schmarotzen, diagnostiziert, von denen die 2 letzteren mir noch nicht bekannt sind.

J. SONAN: Hat im Jahre 1921 in „Taiwan-Nojiho, No. 180, pp. 20–22" zwei noch nicht bekannte Arten, *Exeristes albicincta* MORL. und *Phytodiaetus capuae* MORL. enumeriert, die erstere scheint mir ein Synonym von *Charitopimpla sagrae* VOLL. zu sein; und ferner hat er in dieser Zeitschrift, No. 229, pp. 149–163, 1925, vier noch nicht bekannte Arten, *Henicospilus striatus* CAM., *Echthromorpha notulatoria* F., *Bassus laetatorius* F., *Metopius rufus* CAM., und 2 schon bekannte Arten, *Ephialtes formosanus* CUSH. und *Zacharops narangae* CUSH. diagnostiziert. Eine neue Art, *Henicospilus pseudoconspersae*, und 2 schon bekannte Arten, *Xanthopimpla punctata* F. und *Henicospilus striatus* CAM., wurden von ihm in „Taiwan-Sotoku Chuokenkiujo-Hokoku, Vol. 29, pp. 1–132, 1928", beschrieben. Im nächsten Jahre hat er die 5 folgenden neuen und 7 schon bekannten Arten in „Trans. Nat. Hist. Soc. Formosa, Vol. 19, pp. 415–425" behandelt:

Hymenobosmina posticae SONAN
Charops flavipetiolus SONAN
Delopia nigrifemur SONAN
Holocremus posticae SONAN
Cryptus trirrhogmaniformis SONAN=*Cryptaulax coreanus* SZÉPL.
Dioctes lineatus ISHIDA
Xanthopimpla kuchingensis CAM.
X. stemmator THUNB.
X. punctata F.
X. formosensis KRIEG.=*X. iaponica* KRIEG.
Theronia zebroides KRIEG.
Amauromorpha schoenobii VIER.

Von obengennanten Arten sind die 4 ersten mir noch nicht bekannt gewesen. Noch später, im Jahre 1930 wurden von diesem Autor 8 neue, 2 noch nicht bekannte und 5 schon bekannte Arten erwähnt. Sie lauten wie folgt:

Itoplectis homonae SONAN
Iseropus heichinus SONAN

Anomalon discoidellus SONAN = *Paranomalon discoidellus* SONAN
Limnerium homonae SONAN
Cremastus (*Tarytia*) *shirakii* SONAN
Melcha lemae SONAN = *Goryphus lemae* SONAN
Charops arctornisae SONAN
Pimpla luctosa SM.
Cremastus (*Tarytia*) *biguttulus* MUNAKATA
= *C.* (*Tarytia*) *japonicus* ASH.
Nesopimpla naranyae ASH.
Pimpla formosana CUSH.
Hemipimpla rugosa DE GEER = *Camptotypus rugosus* DE GEER
Theronia zebroides KRIEG.

R. A. CUSHMAN: Hat in „Phil. Journ. Sc., Vol. 20, pp. 590–594, 1922" 2 neue Arten, *Ephialtes formosana* und *Zacharops narangae*, zum ersten Mal beschrieben und ferner im Jahre 1925 in „Ent. Mitteil., Bd. 19, pp. 41–50" die folgenden von H. SAUTER gesammelten 5 neuen und 10 schon bekannten *Xanthopimpla*-Arten enumeriert:

Xanthopimpla grandis CUSH. = *X.* *iaponica* KRIEG.
X. *conica* CUSH.
X. *pleuralis* CUSH.
X. *annulata* CUSH.
X. *brebicauda* CUSH.
X. *brachyparea* KRIEG.
X. *imperfecta* KRIEG.
X. *emaculata* SZÉPL.
X. *stemmator* THUNB.
X. *kuchingensis* CAM.
X. *clavata* KRIEG.
X. *detruncata* KRIEG.
X. *punctata* F.
X. *sauteri* KRIEG.
X. *erythroceros* KRIEG.
X. *aequabilis* KRIEG.

T. UCHIDA: Seit dem Jahre 1925 hat der Verfasser einen grossen Teil seiner Zeit der systematischen Erforschung der japanischen Ichneumoniden gewidmet und aus Formosa bis jetzt die Beschreibung 8 neuen Gattungen, einer neuen Untergattung, 86 neuen Arten, 6 neuen Formen, 27 noch nicht bekannten Arten und 29 schon bekannten Arten in verschiedenen Zeitschriften veröffentlicht. Sie lauten wie folgt:

(1) Zool. Mag. Jap., Vol. 37, pp. 443-457 (1925)
Dinotomus formosanus MATS.
= *Trogus matsumurai* UCH. (nom. nov.)
D. pictus KRIECHB. = *T. pictus* KRIECHB.
Trogus formosanus UCH. = *Callajopa formosana* UCH.
Hadrojoppa horishana MATS. = *Protichneumon horishanus* MATS.
Aglaojoppa hopponis MATS. = *Coelichneumon hopponis* MATS.
A. formosana UCH. = *Coelichneumon formosanus* UCH.
Dimaetha tibialis CAM.

(2) Trans. Nat. Hist. Soc. Formosa, Vol. 15, pp. 279-249 (1925)
Pseudodinotomus UCH. = *Epijoppa* MORL.
Pseudodinotomus tricolor UCH. = *Epijoppa tricolor* UCH.
Aglaojoppa horishana UCH. = *Melanichneumon horishanus* UCH.
A. flavoguttata UCH. = *Coelichneumon flavoguttatus* UCH.
A. formosana UCH. ab. *fuscus* UCH. = *Melanichneumon arakawai* UCH. f. *fuscus* UCH.
Stenichneumon guttatus UCH. = *Stenichneumonoides guttatus* UCH.
Melanichneumon abdominalis UCH.

(3) Journ. Coll. Agr., Hokkaido Imp. Univ., Vol. 18, pt. 2, pp. 43-170 (1926)
Dinotomus formosanus MATS. = *Trogus matsumurai* UCH.
Pseudodinotomus tricolor UCH. = *Epijoppa tricolor* UCH.
Trogus formosanus UCH. = *Callajoppa formosana* UCH.
Hadrojoppa horishana MATS. = *Protichneumon horishanus* MATS.
H. taichuensis MATS. = *P. taichuensis* MATS.
Aglaojoppa hopponis MATS. = *Coelichneumon hopponis* MATS.
A. formosana UCH. = *C. formosanus* UCH.
var. *arakawai* UCH. = *Melanichneumon arakawai* UCH.
var. *fuscus* UCH. = *M. arakawai* UCH. f. *fuscus* UCH.
A. horishana UCH. = *M. horishanus* UCH.
A. flavoguttata UCH. = *Coelichneumon flavoguttatus* UCH.
Atanyjoppa akonis MATS. = *Ischnojoppa luteator* F.
A. flavomaculata CAM.
Dimaetha tibialis CAM.
Hoplismenus miniatus UCH.
Stenichneumon flavolineatus UCH.
= *Stenichneumonoides flavolineatus* UCH.
S. guttatus UCH. = *S. guttatus* UCH.
Togea formosana UCH.

Ctenichneumon tappanus UCH.
C. formosauus UCH.

(4) Trans. Sapporo. Nat. Hist. Soc., Vol. 9, pt. 2, pp. 193-214 (1927)
Epijoppa cyanea UCH.
Stenichneumon rantaizanus UCH.
Melanichneumon kurarensis UCH.
M. tainanensis UCH.

(5) Ins. Mats., Vol. II, Nr. 4, pp. 202-205 (1928)
Eupalamus formosanus UCH.

(6) Journ. Fac. Agr., Hokkaido Imp. Univ., Vol. 21, pt. 5, pp. 177-297 (1928)
Paniscus nigriventris BRUL.
P. ocellaris THOMS.
P. gracilipes THOMS. f. *formosus* MORL.
=*P. gracilipes* THOMS. f. *smithi* D. T.
Parabatus maculifemoratus UCH.
P. baibarensis UCH.
P. kiuhabonus UCH.
P. cristatus THOMS. f. *kikuchii* UCH.
Amebachia UCH.
A. baibarana UCH.
Ophion obscurus F.
O. luteus L.
Dicamptus nigropictus MATS. f. *fuscus* UCH.
Pleuroneurophion longicornis UCH.
Stauropodoctonus orientalis MORL.
Henicospilus mushanus UCH.
H. fuscomaculatus UCH.
H. shinshanus UCH.
H. striatus CAM.
H. lineatus CAM.
H. flavocephalus KIRB.
H. bifasciatus UCH.
H. nigribasalis UCH.
H. formosensis UCH.
H. tainanensis UCH.
H. kanshirensis UCH.
H. taiwanus UCH.
H. reticulatus CAM.

Henicospilus emacescens END.
H. *gyochiensis* UCH.
H. *semiopacus* MATS.
Allocamptus orientalis UCH.
Nototrachys folicator F. f. *formosanus* UCH.
=*Anomalon folicator* F. f. *formosanus* UCH.
Schizoloma amictum F.
Exochilum circumflexum L.=*Therion circumflexum* L.
f. *rufomaculatum* UCH.=*T.* *circumflexum* L. f. *rufomaculatum* UCH.
Trichomma cnaphalocrocis UCH.
Formosanomalon UCH.
F. *baibarense* UCH.
Aphanistes kankoensis UCH.
Agrypon suzukii MATS. f. *nigromaculatum* UCH.
A. *tamahonum* UCH.
Gongroplema tainense UCH.
G. *kikuchii* UCH.
Zacharops narangae CUSH.
Diocles vulgaris MORL.
D. *lineatus* ISHIDA

(7) Journ. Fac. Agr., Hokkaido Imp. Univ., Vol. 25, pt. I, pp. 1–113 (1928)

Formoxorides UCH.
F. *pilosus* SZÉPL.
Theronia clathrata KRIEG.
T. *zebroides* KRIEG.
Echthromorpha notulatoria F.
Pimpla formosana CUSH.
Nesopimpla naranyae ASH.
Apechthis taiwana UCH.
A. *japonica* D. T.
Exeristes albicincta MORL.=*Charitopimpla sagrae* VOLL.
Epiurus taiwanensis UCH.
Xanthopimpla imperfecta KRIEG.
X. *stemmator* THUNB.
X. *emaculata* SZÉPL.
X. *iaponica* KRIEG.
X. *brachyparea* KRIEG.

Xanthopimpla giochiensis UCH.
X. punctata F.
X. kuchingensis CAM.
Hoplitophrys brischkei HOLMGR. f. *flavomaculatus* UCH.
Hemipimpla rugosa DE GEER = *Campoptypus rugosus* DE GEER
Tanera annulipes CAM. = *Syzeuctus indicus* CAM.

(8) Ins. Mats., Vol. 3, Nr. 4, pp. 168–187 (1929)
Epijoppa kurarensis UCH.
Hoplismenus ranrunensis UCH.
Melanichneumon baibarensis UCH.
M. kusukusensis UCH.
Togea unicolor UCH. = *Acanthojoppa unicolor* UCH.
Neotypus taiwanus UCH. = *N. lapidator* F. f. *taiwanus* UCH.

(9) Ins. Mats., Vol. 4, Nr. 1–2, pp. 71–77, (1929)
Protichneumon horishanus MATS. (♀)
P. watanabei UCH.
Ichneumon arisanus UCH.

(10) Journ. Fac. Agr., Hokkaido Imp. Univ., Vol. 25, pt. 4, pp. 243–345 (1930)
Metopius (Ceratopius) rufus CAM. = *M. (Ceratopius) rufus* CAM. f. *kakogawanus* MATS.
M. (Ceratopius) baibarensis UCH.
Bassus laetatorius F.
Colpotrochia pilosa CAM.
Metacoelus formosanus UCH.
Cryptaulax coreanus UCH.
Friona okinawana UCH.
Mesostenus octocinctus ASH. = *Stenaracoides octocinctus* ASH.

(11) Ins. Mats., Vol. V, Nr. 1–2, pp. 94–100 (1930)
Protichneumon karenkoensis UCH.

(12) Ins. Mats., Vol. V, Nr. 3, pp. 121–132 (1930)
Elasmognathias formosanus UCH.
Acoenitus luteus UCH. = *Arotes luteus* UCH.

(13) Journ. Fac. Agr., Hokkaido Imp. Univ., Vol. 30, pt. 3, pp. 163–193 (1931)
Acroricnus ambulator SM. f. *rufiabdominalis* UCH.
Mansa tarsalis CAM.
M. latiscutis CAM.
Cryptus kankoensis UCH.

Cryptus horishanus UCH.
Caenocryptus tamahonis UCH.
Gambrus rufithorax UCH. = *Goryphus rufithorax* UCH.
Orientocryptus UCH.
O. formosanus UCH.
Cryptaulax coreanus SZÉPL.
Amauromorpha schoenobii WIER.
Striatostenus UCH.
S. areolatus UCH.
Mesostenus (Stenaraeus) octocinctus ASH.
= *Stenaraeoides octocinctus* ASH.
M. (Stenaraeus) rufipes SZÉPL. = *S. rufipes* SZÉPL.
Formostenus UCH.
Mesostenus (Formostenus) angularis UUH.
M. (Formostenus) szépligeti UCH.
M. (Stenarella) pilosus SZÉPL.
= *Mesostenus (Mesostenus) pilosus* SZÉPL.
M. (St.) concavus UCH. = *M. (Mes.) concavus* UCH.
M. (St.) subpentaganalis UCH.
= *M. (Mes.) subpentagonalis* UCH.
M. (Mesostenus) takanoi UCH. = *Goryphus takanoi* UCH.
M. (Mes.) longicornis ISHIDA = *G. longicornis* ISHIDA
M. (Mes.) ultimus SZÉPL. = *G. ultimus* SZÉPL.
M. (Mes.) opaeus SZÉPL. = *G. opacus* SZÉPL.
M. (Mes.) albosignatus SZÉPL.
M. (Mes.) hyalinoides UCH. = *G. hyalinoides* UCH.
M. (Mes.) nigribasalis UCH. = *G. nigribasalis* UCH.
Takastenus UCH.
T. longidentatus UCH.
Lactolus shinshanus MATS. = *Ceratocryptus bituberculatus* CAM.
Friona okinawana UCH.
Aphophysius unicolor UCH.
Formocryptus UCH.
F. tenuicornis UCH.

W. CLÉMENT: Eine neue Art (*Metopius formosanus*) wurde von CLÉMENT im Jahre 1929 in „Konowia, Bd. 7, p. 40" beschrieben, diese Art aber nichts anderes als ein Synonym von *Metopius rufus* CAM. f. *kakogawanus* MATS., erkannt.

Wie bekannt, sind bereits eine grosse Anzahl der in Formosa von H. SAUTER gesammelten verschiedenen Insekten von vielen ausländischen Entomologen veröffentlicht worden und zahlreiche Arbeiten über die H. SAUTER'-sche Formosa-Ausbeute sind erschienen; im Gegensatz dazu sind jedoch die Untersuchungen über die echten Schlupfwespen (Ichneumonidae) noch nicht weit gediehen und bis heute wurden nur einige kleine systematische Bearbeitungen derselben von G. ENDERLEIN,[1] R. KRIEGER,[2] V. SZÉPLIGETI,[3] R. A. CUSHMAN[4] und W. CLÉMENT[5] publiziert.

Im vorliegenden Beitrag behandle ich 135 Arten und 8 Formen aus 74 Gattungen, von diesen waren 37 Arten und 2 Formen aus Formosa schon bekannt, während 13 Arten und eine Form für Formosa neu sind und die übrigen 90 Arten, 5 Formen, 8 Gattungen und 2 Untergattungen vielleicht für die wissenschaftliche Welt neu sind.

Das Material, welches ich zu dieser Arbeit benutzt habe, stammt meistens aus der im deutschen entomologischen Museum zu Berlin-Dahlem deponierten Sammlung, einige Holotypen, aber welche H. SAUTER nicht gefunden hatte, sind im entomologischen Museum unserer Universität zu Sapporo aufbewahrt.

Herrn Dr. W. HORN am deutschen entomologischen Museum zu Berlin-Dahlem, der mir wertvolles Material zur Verfügung stellte, spreche ich meinen herzlichen Dank aus. Zum Schluss sage ich meinen verbindlichsten Dank auch Herrn Prof. Dr. S. MATSUMURA, der mir bei dieser Arbeit freundliche Förderung angedeihen liess.

Unterfamilie ICHNEUMONINAE

Trogus matsumurai nom. nov.

Psilomastax formosanus MATSUMURA, Thous. Ins. Jap. Suppl. IV, p. 235, Pl. LV, fig. 24, ♂ (1912).

Dinotomus formosanus UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XVIII, p. 48 (1926).

Fundorte: Kôshun (VII, 1912); Kankau (VII, 1912); gesammelt in zahlreichen ♀ ♂ Exemplaren von H. SAUTER. Der Holotypus in der Sammlung des entomologischen Museums der kaiserlichen Hokkaido Universität zu Sapporo.

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1) G. ENDERLEIN:—Stett. Ent. Zeitg., Jahrg. 73, pp. 105–145 (1912)
   id. :—l. c., Jahrg. 12, pp. 1–45 (1921)
2) R. KRIEGER:—Arch. Naturges., Jahrg. 80, pp. 1–152 (1914)
3) V. SZÉPLIGETI:—Ann. Mus. Nat. Hung., Vol. 12, pp. 414–424 (1914)
   id. :—l. c., Vol. 14, pp. 225–380 (1916)
4) R. A. CUSHMAN:—Ent. Mitt., Bd. 19, pp. 41–50 (1925)
5) W. CLÉMENT:—Konowia, Bd. 7, p. 40 (1929)

Bemerkung: Im „Zeitschr. Ang. Ent., XVIII, p. 397, 1931" hat G. HEINRICH diese Art als ein Synonym von *T. bicolor* behandelt, welcher von O. RADOSZKOVSKI im Jahre 1887 aus Korea beschrieben worden war, sie unterscheidet sich aber vom ihm durch die folgenden Merkmale:

T. matsumurai UCH.	*T. bicolor* RAD.
1. Flügel durchaus gleichmässig stark gelbbraun getrübt, am Randmal mehr braun.	1. Flügel gleichmässig gelb getrübt, am Randmal schwarz.
2. Nervulus interstitial.	2. Nervulus weit hinter der Gabel.
3. Hinterhüften, ihre Trochantern und Schenkel mehr oder weniger bräunlich gefleckt.	3. Hinterbeine ganz schwarz.
4. Area petiolaris nach vorn etwas konvergierend.	4. Area petiolaris nach vorn nicht konvergierend.
5. Hinterleib 2-farbig: die 2 Basalsegmente ganz gelbrot, die übrigen schwarzviolett.	5. Hinterleib ganz schwarzviolett.

Facydes purpureomaculatus CAM.

Facydes purpureomaculatus CAMERON, Ann. Mag. Nat. Hist., VII, p. 279, ♀ (1901); HEINRICH, Zeitschr. Ang. Ent., XVIII, p. 398 (1931).

Fundorte: Taihorin (3 ♀, am 7. XII, 1911); Polisha (1 ♂, am 7. IV, 1909).

Atanyjoppa flavomaculata CAM.

Atanyjoppa flavomaculata CAMERON, Proc. Zool. Soc. Lond., p. 38, ♀ ♂ (1901); MORLEY, Rev. Ichn., pt. IV, p. 57 (1915); UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XVIII, p. 62, ♀ (1926).

Atanyjoppa spinosa CAMERON, Proc. Zool. Soc. Lond., p. 38, ♂ (1901).

Fundort: Tainan (1 ♂, am 22. VII, 1911).

Anmerkung: *Exephanes akonis* MATS., welcher ich im Jahre 1925 in „Zool. Mag., Japan, XXXVII, p. 240" als eine Art von *Atanyjoppa* determiniert habe, scheint mir ein Synonym von *Ischnojoppa luteator* F. (Ent. Syst. Supple., p. 222, 1798) zu sein.

Protichneumon horishanus MATS.

Ichneumon (*Hoplismenus*) *horishanus* MATSUMURA, Thous. Ins. Jap. Suppl. IV, p. 87, Pl. XLVI, fig. 6, ♀ (1912).

Hadrojoppa horishana UCHIDA, Zool. Mag. Japan, XXXVII, p. 447, ♀ (1925).

Protichneumon horishanus UCHIDA, Ins. Mats., Vol. IV, p. 73, ♂ (1929).

Fundort: Polisha (1 ♀, am 7. IV, 1909).

Protichneumon taichuensis MATS.

Ichneumon (Hoplismenus) taichuensis MATSUMURA, Thous. Ins. Jap. Suppl. IV, p. 88, Pl. XLVI, fig. 7, ♀ (non ♂) (1912).

Hadrojoppa taichuensis UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XVIII, p. 54 (1926).

Fundort: Polisha (1 ♀, am 7. IV, 1909).

Protichneumon yayeyamensis MATS.

Ichneumon yayeyamensis MATSUMURA, Thous. Ins. Jap. Suppl. IV, p. 237, Pl. LV, fig. 23, ♀ (1912).

Protichneumon yayeyamensis UCHIDA, Zool. Mag. Japan, XXXVII, p. 449, ♀ ♂ (1925).

Fundort: Kankau (2 ♂, VIII, 1912).

f. ***kankauensis*** nov.

Diese Form unterscheidet sich von der typischen Art durch die ganz braun getrübten Flügel.

Fundorte: Kankau (1 ♂, VIII, 1912); Taihorin (1 ♂, VI, 1911).

Cratojoppa okinawana UCH.

Aglaojoppa okinawana UCHIDA, Zool. Mag. Japan, 37, p. 453, pl. IX, fig. 5, ♂ (1925).

♀. Körper ziemlich robust. Kopf nach hinten rundlich verengt, glänzend, kaum punktiert; Stirn und Fühlergruben strak poliert, die letzteren deutlich tief eingedrückt; Gesicht und Clypeus zerstreut grob punktiert, der letztere in der Mitte leicht gewölbt; Labrum vorragend, am Vorderrand

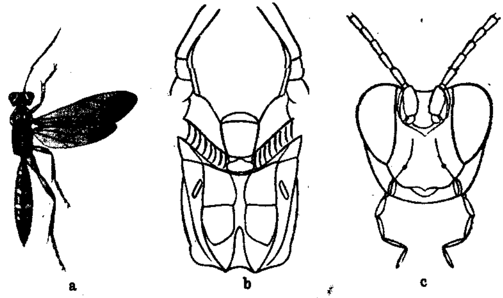


Fig. 1

a. *Cratojoppa okinawana* UCH. (♀)
b. Thorax von oben gesehen von *C. okinawana* UCH.
c. Kopf von vorn gesehen von *C. okinawana* UCH.

deutlich behaart; Mandibeln kräftig, mit 2 gleichen Zähnen. Fühler dick, hinter der Mitte verdickt. Thorax dicht punktiert, besonders das Propodeum; Schildchen flach, beiderseits schwach gerandet; Area basalis und superomedia zusammenhängend, sehr lang; Area petiolaris deutlich schmal. Beine ziemlich dick. Flügel gelblichbraun getrübt; Stigma schwarzbraun; Areola nach oben fast geschlossen; Nervenast klein; Nervulus postfurkal; Nervellus weit unter der Mitte gebrochen. Postpetiolus glatt, mit einigen Punkten, das 2te Segment länger als breit, dicht punktiert, in der Mitte längsgestreift; Gastrocölen gross, tief und glatt, das 3te und 4te Segment quer, nur an der Basis längsgestreift, die übrigen fast glatt. Bohrer kurz vorragend. Körperlänge: 20 mm.

Färbung schwarz mit zahlreichen gelben Flecken. Gelb sind: Gesicht, Schaft unten, Stirnränder, Wangen, Mandibeln mit Ausnahme der Endzähne, Fühler in der Mitte, Hals oben, Schulter, Tegulen, je ein Fleck unter den Flügeln, 2 Linien auf dem Mesonotum, Schildchen beiderseits, Postschildchen, Sternum, Propodeum oben beiderseits, Area basalis, Area superomedia, Area dentipara zum Teil, Hüften, Trochantern, Vorder- und Mittelbeine, Hinterschienen in der Mitte und ihre Tarsen, Petiolus am Ende und die folgenden Segmente hinten beiderseits. Das 6te und 7te Segment am Endrand schmal gelblichweiss gesäumt; die hintersten Hüften schwarz gefleckt, ihre Schenkel bräunlichgelb, an der Spitze schwarz, die Hinterseite der Vorder- und Mittelschenkel, ihre Schienen und Tarsenglieder je am Ende mehr oder weniger bräunlich.

Fundort: Polisha (1 ♂, IV, 1910).

Der Zeichnung und Form nach *Coelichneumon flavoguttatus* Uch. sehr ähnlich, die Felderung des Propodeums ist aber ganz anders verschieden.

Coelichneumon hormaleoscelus sp. nov.

♀. Kopf hinter den Augen deutlich verengt; Stirn und Gesicht zerstreut punktiert; Wangen etwas aufgetrieben; Clypeus vorn abgestutzt, in der Mitte aber ein wenig vorragend. Fühler dick, gegen die Spitze zu verdickt, aber an der Spitze etwas verdünnt. Mesonotum dicht fein und Propodeum und Pleuren dicht grob punktiert; Area basalis und superomedia kaum punktiert; Schildchen flach, beiderseits nicht gerandet. Beine kräftig, besonders die hintersten. Flügel gelblich hyalin; Stigma und Nerven dunkelbraun; Areola oben verschmälert; Nervellet klein; Nervulus leicht hinter der Gabel. Postpetiolus in der Mitte runzelig punktiert, das 2te und 3te Segment spärlich fein punktiert, die übrigen glatt.

Schwarz. Gesicht, Clypeus, Wangen, Mandibeln, Augenränder, Schaft

unten zum Teil, Fühler in der Mitte breit, Hals, Schulter, je eine Linie unter den Flügeln, Mesopleuren zum Teil, Schildchen beiderseits, Hinterschildchen, Vorder- und Mittelhüften, alle Trochantern, Hinterhüften oben zum Teil, ihre Schienen in der Mitte, Vorder- und Mittelschenkel und ihre Schienen vorn sowie auch die beiden Palpen weisslich gefärbt. Postpetiolus am Endrand gelb; das 2te und 3te Segment gelbbraun bis braun, die übrigen Segmente je am Hinterrand schmal hell gesäumt.

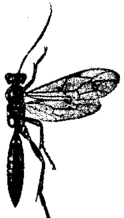
♂. Körper sehr schlank. Fühler ohne weissen Ring; Schaft unten ganz weiss. Hinterhüften schwarz. Das 2te und 3te Hinterleibssegment schwärzlichbraun, nur am Vorder- und Hinterrand bräunlich. Stimmt sonst mit dem Weibchen ganz überein. Körperlänge: ♀ ♂ 12 mm.

Ist mit *C. garugawensis* Uch. am nächsten verwandt, scheint sich jedoch durch die weisse Hüften und die Färbung des Hinterleibs gut zu unterscheiden.

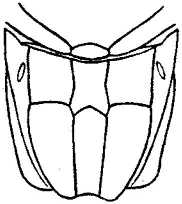
Fundort: Taihorin (2 ♀, 2 ♂, am 7. XI, 1911).

Coelichneumon sauteri sp. nov.

♀. Kopf hinter den Augen deutlich verschmälert; Stirn runzelig; Fühlergruben glatt und glänzend; Gesicht und Clypeus grob punktiert, Vorderrand des letzteren in der Mitte leicht vorragend; Labrum ziemlich



a



b

c

Fig. 2

a. Coelichneumon sauteri Uch. (♀)
b. Propodeum von oben gesehen
c. Die Basalhälfte des Hinterleibs von oben gesehen

lang vorragend; Mandibeln mit 2 ungleichen Zähnen. Fühler hinter der Mitte etwas verdickt. Thorax glänzend, spärlich fein punktiert; Parapsiden schwach; Propodeum dicht punktiert, oben an der Basis fein runzelig, Area petiolaris dicht fein netzartig gerunzelt. Postpetiolus sowie auch der Mittelteil des 2ten und 3ten Segments deutlich längsgestreift; Gastrocölen tief, gross und glatt. Beine von normaler Bildung. Flügel gelblich hyalin; Stigma und Nerven schwärzlichbraun.

Schwarz mit zahlreichen weissen Flecken. Hinterleib deutlich blau schimmernd. Fühler in der Mitte, Stirnränder, Gesicht und Clypeus, mit Ausnahme der Mitte, Wangen, Palpen, Halsrand, Schulter, je eine Linie unter den Flügeln, 2 Linien des Mesonotums, Schildchen beiderseits, je ein grosser Fleck auf den Mesopleuren, ein Fleck auf dem Mesosternum, 4 Makel auf dem Propodeum, Vorder- und Mittelhüften, alle Trochantern, Vorderschenkel vorn, Mittel- und Hinterschenkel an jeder Spitze, Mittelschienen grösstenteils, Hinterschienen hinter der Mitte, ihre Tarsen und das erste, 2te und 3te Segment an jeder Hinterecke weiss; Vorderschienen und -tarsen zum Teil gelbbraun; Metatarsus an der Basalhälfte und der Praetarsus an der Spitzenhälfte schwarz. Das erste und 2te Bauchsegment fast gelbbraun. Körperlänge: 18 mm.

Wegen der Zeichnung des Körpers und der Beine steht diese Art *C. flavoguttatus* Uch. aus Formosa am nächsten, unterscheidet sich jedoch durch den blau schimmernden Hinterleib.

Fundort: Taihorin (1 ♀, am 7. XI, 1911).

Coelichneumon taihorinus sp. nov.

♀. Kopf nach hinten verschmälert; Stirn spärlich und Gesicht dich punktiert; Clypeus vorn abgestutzt; Wangen nicht aufgetrieben. Mesonotum vorn spärlich und hinter der Mitte dicht fein punktiert; Schildchen beiderseits an der Basis gerandet; Mesopleuren und Propodeum deutlich dicht punktiert, das letztere oben an der Basis fein runzelig; Costula undeutlich. Postpetiolus dicht fein runzelig, das erste und 2te Segment dicht fein punktiert, ersteres in der Mitte an der Basis längsrissig; die übrigen Segmente fast glatt. Gastrocölen gross, quer; Thyridien sehr gross. Flügel fast hyalin; Stigma gelbbraun; Nerven dunkelbraun. Fühler hinter der Mitte erweitert.

Schwarz mit zahlreichen weissen Flecken. Fühler in der Mitte, Augenränder breit, Gesicht beiderseits, Clypeus mit Ausnahme der Mitte, Mandibeln an der Basis, Hals oben, je ein Fleck vor und unter den Flügeln, 2 Längsflecke auf dem Mesonotum, je ein grosser unregelmässiger Fleck auf

den Mesopleuren, Schildchen beiderseits, Hinterschildchen, 5 Flecke des Propodeums, Petiolus am Ende, das 2te und 3te Segment an jeder Hinterecke und die übrigen je am Hinterrand weiss, das weisse Band des 4ten Segments zuweilen in der Mitte gebrochen. Beine dunkel bräunlichrot, die Vorder- und Mittelhüften und alle Trochantern weiss, die Hinterhüften schwärzlich, oben aber weiss gefleckt, ihre Schenkel an der Spitze, Schienen und Tarsen schwarz, die Schienen aber in der Mitte gelblichbraun. Körperlänge: 14–17 mm.

♂. Körper schlank. Fühler deutlich gesägt. Gesicht und Clypeus ganz weiss. Stimmt sonst mit dem Weibchen überein. Körperlänge: 12–13 mm.

Fundort: Taihorin (1 ♀ und 2 ♂, am 7. XII, 1911; 1 ♀, am 7. VI, 1911; 2 ♂, am 19. IV, 1911).

Diese Art steht *C. formosanus* Uch. sehr nahe, unterscheidet sich aber von ihm durch die folgenden Merkmale: 1) Gastrocölen viel grösser. 2) Costula des Propodeums undeutlich, Area basalis und superomedia zusammenhängend. 3) Hinterschienen in der Mitte gelblich geringelt. 4) Propodeum mit 5 weissen Flecken.

Coelichneumon kosempensis sp. nov.

♀. Kopf nach hinten stark verschmälert; Stirn dicht fein und Gesicht zerstreut grob punktiert; Clypeus vorn abgestutzt. Fühler hinter der Mitte verdickt. Thorax ziemlich dicht punktiert; Schildchen flach, beiderseits nicht gerandet; Area superomedia gross, hufeisenförmig, spärlich fein gerunzelt. Flügel bräunlich getrübt; Stigma und Nerven schwärzlichbraun. Postpetiolus, das 2te und 3te Segment in der Mitte längsgestreift, die übrigen glatt, glänzend; Gastrocölen auffallend gross, quer und tief.

Schwarz und matt, mit zahlreichen weissen Flecken. Weiss sind: Antennen in jeder Mitte, Gesicht, Clypeus, Augenränder, Wangen, Mandibeln an der Basis, Palpen, Hals, 2 Längsflecke des Mesonotums, Schulter, je eine Linie hinter den Flügeln, Schildchen beiderseits, Hinterschildchen, je ein grosser Makel auf den Mesopleuren, Propodeum hinten beiderseits, das erste Segment am Endrand, das 2te–4te je am Endwinkel, Vorder- und Mittelhüften, alle Trochantern, Vorder- und Mittelschienen und ihre Schenkel vorn, Hinterschienen in der Mitte und alle Tarsen grösstenteils. Hintermetatarsus an Spitze und Basis und der Praetarsus ganz schwarz, andere Hintertarsenglieder nur an jeder Spitze schwärzlich. Hinterleib gegen das Ende zu etwas blau schimmernd. Körperlänge: 16 mm.

Fundort: Kôsempo (1 ♀, IV, 1912).

Das Tier steht *C. sauteri* Uch. sehr nahe, ist aber von ihm sehr leicht durch die Zeichnung der Beine, die Färbung des Hinterleibs, die Form der Gastrocölen und das dicht punktierte Mesonotum zu unterscheiden.

Coelichneumon 10-guttatus sp. nov.

Nahe verwandt mit *C. taihorinus* Uch., von dem sich diese Art aber durch die Färbung der Beine, die Zeichnung des Hinterleibs und Propodeums sowie auch die ganz schwarzen Antennen leicht unterscheidet.

♂. Kopf nach hinten verengt. Antennen gesägt, ohne weissen Ring. Gesicht und Clypeus gelblich weiss, zerstreut punktiert, der letztere vorn fast abgestutzt; Augenränder und Mandibeln weisslich; Labrum grob punktiert; Schildchen flach, beiderseits über die Mitte hinausgerandet; Propodeum oben kaum punktiert, Area superomedia deutlich quer, fast glatt. Flügel hyalin; Stigma schwärzlichbraun. Postpetiolus sowie auch das 2te und 3te Segment längsgerunzelt, aber beiderseits punktiert, das 4te nur an der Basis runzelig, die übrigen glatt; Gastrocölen und Thyridien gross.

Schwarz. Zwei Linien auf dem Mesonotum, Schulter, Hals oben, je eine Linie unter den Flügeln, Schildchen beiderseits, Hinterschildchen, je ein Fleck auf den Brustseiten, 4 Flecke auf dem Propodeum, Vorder- und Mittelhüften, ihre Schenkel und Schienen vorn und alle Trochantern weisslich. Hintertrochantern zum Teil, ihre Schienen und Tarsen fast ganz schwarz, aber die letzteren an jeder Basis gelblich geringelt; alle Schenkel und Vorder- und Mittelschienen hinten dunkelbraun. Das erste -5te Hinterleibssegment je am Hinterwinkel mit weissem Fleck. Körperlänge: 12 mm.

Diese Art ist nahe verwandt mit *C. hormaleoscelus* Uch., von welchem sie jedoch durch die folgenden Unterscheide absondert: Mesonotum mit 2 weissen Linien. Das 1te–5te Hinterleibssegment je am Endwinkel weiss.

Fundort: Taihorin (1 ♂, V, 1910).

Coelichneumon ampingensis sp. nov.

♂. Kopf hinter den Augen stark verschmälert, glatt; Antennen deutlich gesägt, ganz schwarz, nur der Schaft unten weiss; Gesicht und Clypeus zerstreut fein punktiert, ganz weiss; Augenränder, Mandibeln und Palpen weisslich. Thorax schwarz mit zahlreichen weissen Makeln, ziemlich stark glänzend; Schildchen flach, nicht gerandet. Propodeum glatt, Costula stark angedeutet. Flügel gelblich hyalin. Beine schwarz; Vorder- und Mittelhüften, alle Trochantern, Vorder- und Mittelschenkel vorn, ihre Schienen grösstenteils und die hintersten Schienen an der Basis weisslich; Mittel- und Hintertarsen braun, die vorderen gelbbraun; Hinterhüften oben mit

weissem Fleck. Hinterleib schwarz, der Petiolus am Ende, das 2te–6te Segment je am Hinterwinkel weiss.
Körperlänge: 13–18 mm.

Fundorte: Amping (1 ♂, VIII, 1909); Taihorin (1 ♂, V, 1910).

Das Tier steht *C. taihorinus* UCH. und *C. 10-guttatus* UCH. sehr nahe, unterscheidet sich jedoch vom ersteren durch die Färbung der Beine, die Zeichnung und Form des Hinterleibs und die ganz schwarz gefärbten Antennen, und vom letzteren durch die Zeichnung von Propodeum und Beine sowie auch die Form des Hinterleibs.

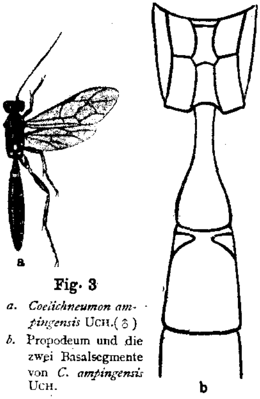


Fig. 3
a. *Coelichneumon ampingensis* UCH. (♂)
b. Propodeum und die zwei Basalsegmente von *C. ampingensis* UCH.

Coelichneumon formosanus UCH.

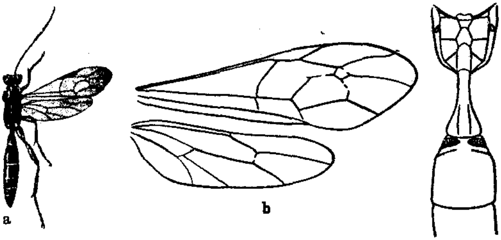
Aglaojoppa formosana UCHIDA, Zool. Mag. Japan, XXXVII, p. 453, Pl. IX, fig. 7, ♀ (1925); id., Journ. Fac. Agr., Hokkaido Imp. Univ., XVIII, p. 60, ♀ (1926).

Fundorte: Taihoku (1 ♂, IV, 1912); Tainan (3 ♂, am 7. V, 1912; 1 ♀, IV, 1912).

Das von mir im Jahre 1925 in „Trans. Nat. Hist. Soc. Formosa, Vol. XV, p. 244" als *C. formosanus* beschriebene Männchen ist nicht das Männchen dieser Art, sondern es ist ein Männchen einer neuen Art, welche zur Gattung *Melanichneumon* gehört, deshalb möchte ich dieser Art einen neuen Namen „*M. tamahonis*" geben. Da das Männchen von *C. formosanus* bis jetzt von niemand beschrieben worden ist, gebe ich im folgenden die Beschreibung desselben: Das Männchen stimmt mit dem Weibchen in der Färbung und Zeichnung fast ganz überein, jedoch die Fühler sind deutlich gesägt und das Gesicht ist ganz weiss gefärbt. Körperlänge: 12 mm.

Coelichneumon fulvibasalis sp. nov.

♂. Kopf nach hinten deutlich verengt; Scheitel fein punktiert; Stirn spärlich gerunzelt; Gesicht und Clypeus zerstreut grob punktiert, der letztere vorn abgestutzt; Labrum versteckt. Fühler mässig dick, deutlich gesägt. Thorax dicht punktiert, matt; Schildchen flach, beiderseits über die Mitte hinausgerandet; Area superomedia klein, Costula in der Mitte, kräftig.



a b c

Fig. 4

a. Coelichneumon fulvibasalis UCH. (♀)
b. Vorder- und Hinterflügel von *C. fulvibasalis* UCH.
c. Propodeum und die zwei Basalsegmente von *C. fulvibasalis* UCH.

Flügel fast hyalin; Nervulus etwas vor der Gabel. Postpetiolus flach, in der Mitte undeutlich fein runzelig, das 2te und 3te Segment quadratisch, dicht punktiert, aber an jeder Basis längsgestreift; Gastrocölen tief; Thyridien sehr gross, quer und glatt.

Schwarz mit zahlreichen weissen Flecken. Fühler in der Mitte, Gesicht, Clypeus, Augenränder, Mandibeln, Palpen, Halsrand, Schulter, Schildchen beiderseits, Hinterschildchen, je eine Linie unter den Flügeln, je ein Fleck auf den Mesopleuren, je ein Längsfleck unter den Hinterflügeln, 2 grosse Flecke des Propodeums und jedes Hinterleibssegment am Hinterrand weiss. Beine gelbbraun bis dunkelbraun, die Vorder- und Mittelhüften und ihre Trochantern weiss, die Hinterhüften schwarz, mit weissem Fleck auf der Oberseite, die Hinterschienen und -tarsen schwarz, die ersteren in der Mitte gelblichbraun geringelt; alle Schienenendsporen weisslich. Körperlänge: 13 mm.

Fundorte: Taihorin (1 ♂, V, 1910); Amping (1 ♂, V, 1910).

Dem *C. formosanus* UCH. am nächsten, aber verschieden durch die Färbung der Beine, die grossen Thyridien sowei auch die Form des 2ten und 3ten Hinterleibssegments. Das Weibchen noch nicht bekannt.

Acanthojoppa (Erythrojoppa) saateri sp. nov.

♀, ♂. Kopf glatt, glänzend; Gesicht spärlich punktiert; Clypeus vorn breit abgerundet, beiderseits tief gefurcht; Mandibeln horizontal, am Ende zugespitzt, mit 2 ungleichen Zähnen, der untere kürzer; Schläfen

sehr breit, glatt, stark glänzend. Fühler kürzer als der Körper, fadenförmig, hinter der Mitte leicht erweitert, einige Basalglieder deutlich länger als breit; Schaft länglich oval, hinten tief ausgeschnitten; beim Männchen die Fühler gegen die Spitze zu unten schwach gesägt. Thorax lederartig

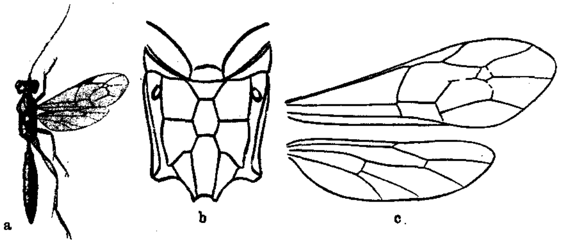


Fig. 5

a. *Acanthojoppa (Erythrojoppa) sauteri* UCH. (♀)
b. Propodeum von oben gesehen
c. Beide Flügel von *Acanthojoppa (Erythrojoppa) sauteri* UCH.

punktiert, matt; Propodeum oben runzelig, ganz gefeldert, Area superomedia deutlich lang wie bei *Cratojoppa* CAM.; Costula kräftig; Luftlöcher lang gestreckt; Schildchen flach, beiderseits gerandet. Flügel gelblich hyalin; Stigma und Nerven gelbrot. Hinterleib fein punktiert, der Postpetiolus am Ende glatt, jedes Segment länger als breit. Körperlänge: 14–17 mm.

Grundfarbe einfarbig gelbrot. Fühler in der Mitte weisslichgelb, am Ende dunkelbraun bis schwärzlich.

Fundorte: Kankau (1 ♀, 3 ♂, VI, VIII und IX, 1912); Taihorin (1 ♀, 3 ♂, am 7. XI, 1911).

Diese Art unterscheidet sich von den übrigen Arten dieser Gattung durch das flache und ganz gerandete Schildchen.

Erythrojoppa subgen. nov.

Kopf nach hinten deutlich aufgetrieben, von oben gesehen fast quadratisch; Occiput breit und tief ausgerandet; Schläfen stark aufgetrieben; Mandibeln horizontal, mit 2 ungleichen Zähnen, die untere kürzer als die obere; Palpen schlank und lang; Clypeus flach, glatt, vorn breit abgerundet;

Labrum versteckt. Fühler hinter der Mitte leicht verdickt. Propodeum hinten beiderseits mit einem kleinen Zahn versehen; Felder ganz gebildet, Area superomedia viel länger als breit; Luftlöcher lang; Schildchen flach, seitwärts gerandet. Hinterleib schlank und lang, am Ende deutlich zugespitzt. Bohrer kurz vorragend. Hinterschenkel reicht zum Ende des 2ten Hinterleibssegments. Gastrocölen undeutlich; Thyridien sehr gross und glatt. Areola im Vorderflügel pentagonal, nach oben verengt; Nervulus interstitial; Nervellus weit hinter der Mitte gebrochen. Klauen einfach.

Genotypus: *Acanthojoppa* (*Erythrojoppa*) *sauteri* UCH.

Diese Untergattung weicht von der typischen Gattung durch das flache und ganz gerandete Schildchen leicht ab.

Bemerkung: *Togea unicolor* UCH. (Ins. Matsumur., III, p. 173, ♂ 1929) gehört zur Gattung *Acanthojoppa* CAM. (Entom., XXXV, p. 109, 1902).

Egurichneumon agitatus MATS. et UCH. f. *formosanus* nov.

♂. Diese Form unterscheidet sich von dem Männchen der typischen Art durch die folgenden Charaktere: 1) Gesicht beiderseits weiss. 2) Fühler ohne weissen Ring. 3) Schulter und je ein Fleck unter den Flügeln weiss. 4) Alle Schienen und Tarsen dunkelrot wie bei f. *rufipes* UCH.

Fundort: Taihorin (1 ♂, am 7. VII, 1912).

Eupalamus formosanus UCH.

Eupalamus formosanus UCHIDA, Ins. Mats., II, p. 204, ♀ (1928).

Fundort: Taihorin (1 ♂, am 7. XI, 1911).

Die Färbung und Zeichnung des Männchens stimmt mit der des Weibchens ganz überein.

Stenichneumonoides flavolineatus UCH.

Stenichneumon flavolineatus UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XVIII, p. 94, Pl. X, fig. 10, ♀ ♂, (1926).

Stenichneumonoides flavolineatus UCHIDA, Ins. Mats., V, p. 96, ♀ ♂ (1926).

Fundorte: Taihorin, Tainan, Polisha und Kankau; gesammelt in zahlreichen ♀ ♂ Exemplaren von H. SAUTER.

Melanichneumon kusukusensis UCH.

Melanichneumon kusukusensis UCHIDA, Ins. Mats., III, p. 172, ♂ (1929).

Fundorte: Taihorin (5 ♂, am 7. VI, 1911); Tainan (1 ♂, am 22. VII, 1911).

Melanichneumon kurarensis UCH.

Melanichneumon kurarensis UCHIDA, Trans. Sapporo Nat. Hist. Soc., IX, p. 203, Pl. VII, fig. 6, ♀ (1927).

Fundort: Taihorin (3 ♂, am 7. VII, 1911).

Bemerkung: Das Männchen, welches von mir als das Männchen dieser Art determniert wurde, ist ein Männchen einer neuen Art (*M. funkikonis*), deshalb gebe ich im folgenden die Beschreibungen der Männchen von *M. kurarensis* UCH. und *M. funkikonis* (sp. nov.).

♂. Gesicht in der Mitte, Clypeus, Schaft unten, Propodeum hinten beiderseits und das 2te und 3te Hinterleibssegment am Endrand weiss; das 2te Segment in der Mitte schwärzlich. Sonst mit dem Weibchen übereinstimmend.

Melanichneumon funkikonis sp. nov.

Melanichneumon kurarensis UCHIDA (partim), Trans. Nat. Sapporo Hist. Soc., IX, p. 204, ♂ (1927).

Diese Art ähnelt *M. kurarensis*, unterscheidet sich aber von ihm durch die folgenden Charakteristika: 1) Fühler schwarz, in der Mitte mit weissem Ring. 2) Seiten des Gesichts und Clypeus weiss. 3) Alle Hüften und Trochantern schwarz, die Schenkel zum Teil schwärzlich. 4) Propodeum ohne weissen Fleck. 5) Postpetiolus und die 2 folgenden Segmente ganz rot.

Fundort: Funkiko (1 ♂, am 6. V, 1926, S. ISSIKI).

Das Weibchen unbekannt.

Der Holotypus in der Sammlung des Museums der kaiserlichen Hokkaido Universität zu Sapporo.

Melanichneumon tamahonis UCH.

Aglaojoppa formosana UCHIDA (partim), Trans. Nat. Hist. Soc. Formosa, XV, p. 244, ♂ (1925).

Fundort: Taihorin (1 ♀, am 7. XII, 1911).

♀. Fühler fadenförmig, schwarz mit breitem weissen Ring in der Mitte. Stirnränder und Clypeus beiderseits weiss. Thorax, mit Ausnahme des Schildchens, ganz schwarz. Stimmt sonst mit dem Männchen ganz überein.

Melanichneumon futasujii sp. nov.

♀. Kopf nach hinten stark verschmälert; Gesicht fein punktiert, flach; Clypeus vorn abgestutzt; Mandibeln dünn, mit 2 ungleichen Zähnen. Fühler fadenförmig, das erste Geisselglied deutlich länger als die übrigen. Thorax

auffallend dicht und fein punktiert, matt; Mesonotum lederartig; Schildchen flach, nur an der Basis seitlich gerandet; Areola gross, hexagonal. Hinterleib dicht fein punktiert, aber das Mittelfeld des Postpetiolus sehr fein runzelig; Gastrocölen tief, verhältnismässig gross. Körperlänge: 9,5 mm.

Schwarz. Fühler in der Mitte, Gesicht, Augenränder, Clypeus, Mandibeln, Palpen, Halsrand, je eine Linie vor und unter den Flügeln, 2 Linien auf dem Mesonotum, Naht des Thorax, Schildchen mit Ausnahme der Basis, Hinterschildchen und Vorder- und Mittelhüften und ihre Trochantern weiss; Propodeum zum Teil schwarzbraun; Beine und Hinterleib an der Basis (das 1.-3. Segment), die Hinterhüften und -schenkel und die Spitzen der Schienen schwärzlich, das 2te und 3te Hinterleibssegment auf der Rückenseite zum Teil dunkel gefleckt, die übrigen Segmente je am Hinterrand schmal hell gesäumt.

♂. Fühler schwach gesägt ohne weissen Ring. Körper schlank. Die Hinterstentarsen schwärzlichbraun. Stimmt sonst mit dem Weibchen überein. Körperlänge: 8,5 mm.

Fundort: Taihorin (1 ♀, 2 ♂, IV, V. 1910).

Diese Art steht *M. tricolor* UCH. nahe. Sie unterscheidet sich von diesem durch die Zeichnung des Mesonotums sowie auch die Färbung des Thorax, der Beine und des Hinterleibs.

Melanichneumon tricolor sp. nov.

♂. Kopf hinter den Augen rundlich verschmälert; Gesicht fein punktiert; Mandibeln sehr schlank, der untere Zahn viel kürzer als der obere. Fühler ziemlich kräftig, gesägt, kürzer als der Körper. Mesonotum ganz matt, spärlich fein punktiert; Parapsidenfurchen kurz, sehr tief; Schildchen flach, fast bis zur Spitze seitlich gerandet; Pleuren und Propodeum zerstreut-punktiert, schwach glänzend; Felderung des letzteren deutlich, Area superomedia länger als breit, Costula kräftig. Flügel gelblich hyalin; Stigma dunkelbraun. Beine und Hinterleib ziemlich schlank; Petiolus glänzend, glatt, mit einzelnen feinen Punkten, das Mittelfeld des Postpetiolus schwach eingedrückt, das 2te und 3te Segment dicht punktiert, das erstere deutlich länger als breit. Gastrocölen undeutlich; Thyridien gross und glatt. Körperlänge: 10–11 mm.

Gelbrot. Antennen dunkelbraun, gegen die Spitze zu schwärzlich, in der Mitte breit weiss geringelt. Gesicht, Schaft unten, Clypeus, Mandibeln, Palpen, Stirnränder, Schläfen zum Teil, Prosternum, Vorder- und Mittelhüften, ihre Trochantern und Hinterleibsende weiss; Kopf und Mesonotum schwarz; Scutellum von der Grundfarbe, aber an der Spitzenhälfte weiss-

lich; Hinterleib gegen das Ende zu schwärzlich; Hinterschenkel und -schienen am Ende und der Metatarsus schwarzbraun, die hintersten Tarsen weisslich.

Fundort: Taihorin (1 ♂, am 1. V, 1911; 4 ♂, am 7. XI, 1911).

Das Tier unterscheidet sich von *M. kusukusensis* UCH. durch das schwarze Mesonotum.

Melanichneumon semicircularis sp. nov.

♀, ♂. Kopf nach hinten deutlich verengt, dicht fein punktiert. Fühler ziemlich schlank, kürzer als der Körper; beim Männchen gesägt. Thorax dicht fein punktiert, matt; Schildchen bis zur Spitze seitlich gerandet; Area superomedia hexagonal, beim Männchen hufeisenförmig. Hinterleib lederartig fein punktiert; Thyridien ziemlich gross. Beine schlank. Flügel bräunlich hyalin; Stigma braun; Areola nach oben geschlossen; Ramellus fehlend; Nervulus interstitial. Körperlänge: 9 mm.

Schwarz. Gesicht, Clypeus, Mandibeln, Palpen, Stirnränder, Schaft unten, Schläfen, Schulter, je eine Linie unter den Flügeln, Naht des Thorax, je ein grosse Längsfleck der Mesopleuren, Schildchen, Vorder- und Mittelhüften, Trochantern der Vorder- und Mittelbeine und das Hinterleibsende weisslich; beim Weibchen Gesicht und Clypeus in der Mitte schwarz gefleckt; Propodeum hinten beiderseits weisslich. Beine und Hinterleib in der Mitte rot, die hintersten Beine zum Teil schwärzlich.

Fundort: Suishario (1 ♂, X, 1911; 1 ♀, X, 1911).

Die Art kommt *M. tricolor* UCH. sehr nahe, unterscheidet sich aber von ihm durch die Form der Area superomedia.

Melanichneumon ramellaris sp. nov.

♂. Kopf nach hinten rundlich verschmälert, kaum punktiert; Scheitel etwas aufgetrieben; Gesicht und Clypeus spärlich punktiert; Labrum nur wenig vorragend. Fühler kürzer als der Körper, gesägt. Mesonotum ganz matt, lederartig fein punktiert und fein weisslich pubescent. Schildchen rundlich, nicht gerandet. Brustseiten dicht punktiert; Propodeum runzelig punktiert, Area superomedia ziemlich klein. Hinterleib dicht fein punktiert, gegen das Ende zu glatt; Thyridien gross. Flügel hyalin; Stigma schwarzbraun; Areola nach oben verengt, nicht geschlossen; Ramellus deutlich; Nervulus etwas hinter der Gabel. Körperlänge: 11 mm.

Schwarz und matt. Gesicht, Schaft unten, Clypeus, Stirn beiderseits, Palpen, Mandibeln, Vorder- und Mittelhüften, deren Trochantern, Schildchen an der Spitzenhälfte und das Hinterleibsende weisslich. Vorder- und Mittel-

beine gelbbraun, die Hinterschenkel rotbraun, ihre Schienen und Tarsen schwärzlich; Propodeum hinten beiderseits gelbbraun; Postpetiolus am Endrand und die 2 folgenden Segmente an jedem Vorder- und Hinterrand braun gesäumt.

Fundort: Taihorin (1 ♂, V, 1910).

In Gestalt und Färbung ist diese Art der vorhergehenden Art sehr ähnlich, unterscheidet sich jedoch von ihr durch die Form von Area superomedia und Areola, die Punktierung des Thorax und den deutlichen Ramellus.

Melanichneumon parvidentatus sp. nov.

♂. Kopf nach hinten verengt; Scheitel schmal; Stirn und Gesicht dicht fein punktiert; Labrum etwas vorragend, am Vorderrand lang braun behaart. Fühler mässig dick, etwas kürzer als der Körper, unten gegen die Spitze zu gesägt. Thorax matt, dicht fein punktiert; Propodeum oben runzelig punktiert, mit kleinen Seitenzähnen, Area superomedia deutlich breiter als lang; Schildchen fast glatt, glänzend, beiderseits über die Mitte hinausgerandet. Flügel hyalin; Stigma schwarzbraun, Areola oben stark verengt oder fast geschlossen; Nervulus interstitial. Die Punktierung des Hinterleibs dichter und grösser als die des Thorax, besonders das 2te und 3te Segment grob punktiert; Postpetiolus am Ende in der Mitte glatt und glänzend; Thyridien undeutlich. Körperlänge: 9 mm.

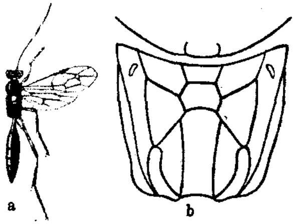


Fig. 6

a. Melanichneumon parvidentatus Uch. (♂)
b. Propodeum von oben gesehen von *M. parvidentatus* Uch.

Schwarz und matt. Fühler weiss geringelt. Gesicht, Clypeus, Palpen, Stirn beiderseits, Tegulen, Halsrand, je ein Makel vor und unter den Tegulen, Schildchen grösstenteils und Hinterleibsende weiss. Schildchen an der Basis rötlichgelb. Vorder- und Mittelhüften, deren Trochantern, Hintertarsen, mit Ausnahme des Metatarsus, und Hinterleibsstiel buttergelb. Beine rot, die hintersten Schenkel an der Spitze und deren Schienen an der Endhälfte schwärzlich. Suturen zwischen den vorderen Hinterleibssegmenten bräunlich gesäumt.

Fundort: Taihorin (1 ♂, V, 1910).

Diese Art steht *M. kurarensis* Uch. ziemlich nahe, doch die Form der

Area superomedia und die Färbung des Hinterleibs sind ganz anders.

Melanichneumon baibarensis UCH.

Melanichneumon baibarensis UCHIDA, Ins. Mats., III, p. 171, fig. 3, ♀ ♂ (1929).

Fundorte: Suishario (1 ♀, X, 1911); Taihorin (1 ♂, am 7. VII; 2 ♂, am 7. XI; 1 ♀, am 29. X; 1 ♀, am 10. V; 1 ♀, am 2. IV, 1911). Kosempo (1 ♀, II, 1910).

Togea formosana UCH.

Togea formosana UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XVIII, p. 112, Pl. VI, fig. 3, ♀ ♂ (1926).

Fundort: Hôzan (1 ♂, am 7. IX, 1910)

Barichneumon suisharioensis sp. nov.

♂. Kopf und Thorax fein weisslich pubescent, der erstere nach hinten verengt; Stirn und Gesicht punktiert; Clypeus zerstreut punktiert und vorn abgestutzt. Thorax schwach glänzend; Schildchen flach, nicht gerandet; Area superomedia glatt und glänzend. Flügel hyalin, am Randmal verdunkelt; Stigma braun. Hinterleib lederartig punktiert, das Mittelfeld des Postpetiolus glatt. Fühler gesägt. Körperlänge: 7 mm.

Schwarz. Fühler unten schwarzbraun. Gesicht und Clypeus beiderseits sowie auch die Stirnränder weiss. Schildchen an der Spitze weiss. Alle Schienen, Tarsen und Vorderhüften dunkelrot, Hinterleib in der Mitte (das 2te - 3te Segment) dunkelrot bis schwärzlichbraun.

♀. Fühler deutlich kräftig, sehr kurz, einige Basalgeisselglieder quadratisch, in der Mitte weiss geringelt. Gesicht ganz schwarz; Scheitel beiderseits mit je einem kleinen weissen Fleck. Scutellum glatt, flach, stark glänzend, zuweilen ganz schwarz. Area superomedia glatt, fünfseitig. Das 1te - 3te Hinterleibssegment blutrot, das Hinterleibsende weiss. Trochantern und Vorder- und Mittelhüften weiss gefleckt. Körperlänge: 7–8 mm.

Fundorte: Suishario (1 ♂, am 7. XII, 1910); Taihorin (3 ♂, V, 1910; 1 ♀, am 7. XI, 1911); Tainan (1 ♀, am 22. VII, 1911).

Unterscheidet sich von *B. sambonis* UCH.* durch das zerstreut punktierte Schildchen.

Barichneumon tainanensis sp. nov.

♀. Kopf ganz schwarz, matt, nach hinten stark verengt; Gesicht

* *Melanichneumon sambonis* UCHIDA, Journ. Coll. Agr., Hokkaido Imp. Univ., XVIII, p. 103, ♀ (1926).

gewölbt. Fühler kürzer als der Körper, fadenförmig, gegen das Ende zu etwas verdickt, einige Basalgeisselglieder etwas länger als breit, das 5te quadratisch. Mesonotum matt, lederartig fein punktiert; Schildchen flach, nicht gerandet; Propleuren fein runzeling punktiert; Propodeum und Hinterleib fein punktiert; Area superomedia hexagonal. Flügel fast hyalin; Stigma und Nerven braun. Körperlänge: 7–8 mm.

Schwarz. Fühler in der Mitte weiss, jedes Geisselglied am Ende bräunlich; Schaft unten, Mandibeln und Clypeus beiderseits dunkel rotbraun; Schildchen und Hinterleibsende weiss; Beine und Hinterleib rot, die Hinterschenkel am Ende, deren Schienen an der Spitzenhälfte und die Tarsen ganz schwärzlichbraun, das 4te und 5te Segment des Hinterleibs schwarz.

♂. Körper schlank. Schaft unten, Seiten des Gesichts und Clypeus, Palpen, Vorder- und Mittelhüften und deren Trochantern weiss. Hinterhüften zuweilen schwärzlich. Stimmt sonst mit dem Weibchen überein.

Fundorte: Tainan (4 ♀, am 7. V, 1912); Kankau (1 ♂, am 7. IV, 1912); Chosokei (1 ♂, 1914); Suishario (1 ♂, XI, 1911; 1 ♂, am 7. XII, 1911).

Das Tier schliesst sich eng an *B. suisharioensis* UCH. an, weicht aber von ihm durch die folgenden Charakteristika ab: 1) Fühler und Beine etwas schlanker. 2) Thorax und Hinterleib ganz matt, fein punktiert. 3) Bei beiden Geschlechtern das Schildchen und Hinterleibsende weiss.

Barichneumon hozanensis sp. nov.

♀. Kopf hinter den Augen rundlich verschmälert; Stirn, Gesicht und Clypeus zerstreut grob und stark punktiert; Gesicht in der Mitte rundlich konvex; Clypeus vorn fast abgestutzt; Mandibeln ziemlich kräftig, mit 2 kleinen, ungleichen Zähnen. Fühler dick, fadenförmig, das erste Geisselglied nur wenig länger als breit, das 2te quadratish. Thorax stark glänzend; Mesonotum zerstreut fein, Pleuren und Propodeum grob punktiert; Schildchen flach, bis zur Mitte seitlich gerandet; Area superomedia hexagonal; Costula kräftig. Beine deutlich dick, besonders die hintersten. Hinterleib dicht punktiert, gegen das Ende zu glatt, der Postpetiolus zerstreut punktiert; Gastrocölen klein. Flügel hyalin; Stigma dunkelbraun; Areola nach oben geschlossen.

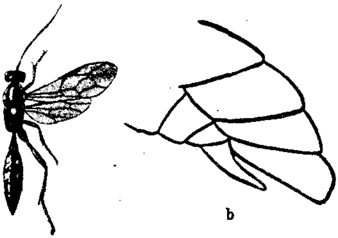
Schwarz und ziemlich glänzend. Schaft unten rotbraun; Mandibeln schwarzbraun. Innere und externe Augenränder zum Teil, Clypeus beiderseits, Schildchen an der Spitzenhälfte und das erste und 2te Hinterleibssegment je am Endwinkel gelb. Beine blutrot, alle Hüften und Trochantern schwarz, die Hinterschienen und -tarsen etwas verdunkelt. Hinter-

leibsende bräunlich. Körperlänge: 8,5 mm.

Fundort: Hôzan (1 ♀, 11, 1910).

Amblyteles sauteri sp. nov.

♂. Kopf hinter den Augen verengt; Stirn querrunzelig; Gesicht und Clypeus dicht fein punktiert; der letztere vorn fast abgestutzt; Labrum vorragend; Mandibeln schlank, mit 2 kleinen, ungleichen Zähnen; Palpen schlank. Fühler ziemlich dick, fadenförmig, kürzer als der Körper, unten gesägt. Thorax dicht punktiert; Schildchen rundlich konvex; Area superomedia vierseitig, breiter als lang; Costula undeutlich; Seitenzähne des Propodeums klein. Hinterleib länglich oval, dicht fein punktiert, gegen das Ende zu glatt; Petiolus mit 2 Längskielen in der Mitte; Postpetiolus dicht gerunzelt; Gastrocölen mittelgross, nicht tief. Genitalklappen gross; das letzte Bauchsegment schmal und lang. Flügel bräunlich getrübt; Stigma dunkelbraun; Areola pentagonal; Nervulus interstitial; Ramellus klein. Beine von normaler Bildung.



a b

Fig. 7

a. Amblyteles sauteri UCH. (♂)

b. Hinterleibsende von der Seite gesehen

Körperlänge: 13 mm.

Schwarz und matt. Gelb sind: Schaft unten, Gesicht und Clypeus, mit Ausnahme der Mitte, Mandibeln, Palpen, Hals oben, Tegulen, Schulter, je eine Linie unter den Flügeln, Schildchen, Vorder- und Mittelbeine, Hintertrochantern zum Teil, zugehörige Schienen an der Basalhälfte und Tarsen, das 2te und 3te Hinterleibssegment beiderseits und das Hinterleibsende. Die Vorder- und Mittelschenkel aussen schwärzlich, innen gelbrot, die hintersten an jeder Basalhälfte gelbrot. Fühler in der Mitte gelb gefleckt.

Fundort: Taihorin (1 ♂, 7. VII, 1911).

Unterscheidet sich von der folgenden Art durch die Zeichnung des 2ten und 3ten Hinterleibssegments.

Amblyteles kankoensis sp. nov.

♀, ♂. Kopf glatt, glänzend, hinter den Augen rundlich verschmälert; Gesicht flach; Clypeus vorn abgestutzt, nicht vom Gesicht geschieden; Mandibeln ziemlich kräftig. Fühler kurz, fadenförmig. Mesonotum zerstreut und Pleuren dicht fein punktiert; Propodeum oben runzelig, aber an der Basis runzelig punktiert; Schildchen leicht rundlich konvex, nur an der Basis gerandet; Area superomedia quer, hinten ausgerandet. Hinterleib länglich oval, dicht grob runzelig punktiert, der Postpetiolus breit, in der Mitte fein längsrissig, beiderseits zerstreut grob punktiert; Gastrocölen mittelgross und tief. Bohrer ganz versteckt. Flügel bräunlich hyalin; Stigma schwarzbraun; Areola pentagonal; Ramellus deutlich; Nervulus interstitial. Beine mässig dick. Körperlänge: 12–13 mm.

Schwarz, reichlich weiss gezeichnet. Fühler schwärzlichbraun, in der Mitte breit weiss geringelt; Schaft unten, Gesicht und Clypeus, mit Ausnahme der Mitte, Augenränder, Wangen, Mandibeln, Palpen, Schildchen, Postschildchen, Hals oben, je ein Fleck unter den Hinterflügeln, je eine Linie vor und unter den Flügeln, Propodeum hinten beiderseits, Vorder- und Mitteltrochantern und alle Hüften weisslich, die Hinterhüften unten an der Basis schwarz. Beine gelbrot, die hintersten an der Spitze und deren Tarsen verdunkelt. Jedes Hinterleibssegment am Endrand weisslichgelb.

Fundort: Kankau (2 ♀, 2 ♂, am 22, IV, 1912).

Der Zeichnung des Körpers und der Beine nach *M. baibarensis* UCH. sehr ähnlich, weicht aber von ihm durch die ganz versteckten Bohrer ab.

Platylabus formosanus sp. nov.

♀, ♂. Kopf glänzend, nach hinten deutlich verschmälert; Stirn und Scheitel glatt; Gesicht und Clypeus fein punktiert, der letztere rundlich konvex; Labrum vorragend; Mandibeln schlank, mit 2 kleinen Zähnen; das 2te Glied des Kiefertasters auffallend gross. Antennen fast von Körperlänge, fadenförmig, hinter der Mitte leicht verdickt; Schaft oval, hinten tief ausgeschnitten. Thorax dicht fein punktiert, aber die Pleuren glatt; Propodeum oben runzelig, mit kleinen Seitenzähnen; Area superomedia quadratisch; Costula schwach; Luftlöcher klein und oval; Schildchen spärlich fein punktiert, rundlich, beiderseits gerandet. Flügel hyalin; Areola oben geschlossen; Ramellus klein; Nervulus interstitial. Postpetiolus runzelig, das 2te und 3te Hinterleibssegment dicht punktiert, matt, die übrigen glatt, schwach glänzend; das 2te Segment deutlich länger als breit und an der Basis stark verschmälert, das folgende quer; Gastrocölen und Thyridien gross und tief.

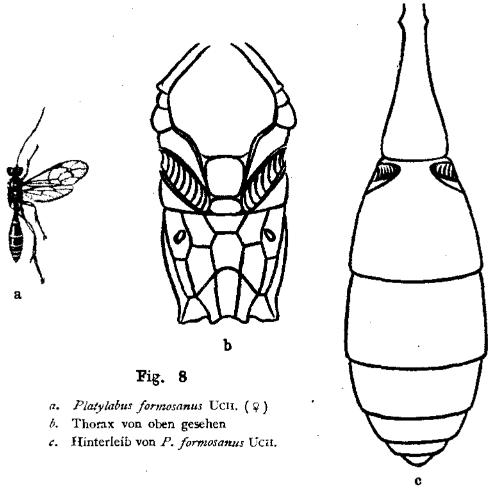


Fig. 8

a. Platylabus formosanus UCH. (♀)
b. Thorax von oben gesehen
c. Hinterleib von *P. formosanus* UCH.

Schwarz mit zahlreichen weissen Flecken. Weiss sind: Fühler in der Mitte, Schaft unten, Gesicht beiderseits (beim Männchen das Gesicht und der Clypeus ganz), Wangen, Stirn- und Scheitelränder, Labrum, Kiefertaster, Vorder- und Mittelhüften, deren Trochantern, Schildchen, Halsrand, je eine Linie vor und unter den Teguren, 2 Längsflecke des Mesonotums, Mesopleuren zum Teil, Propodeum hinten beiderseits und alle Hinterleibssegmente je am Hinterrand. Beine rot, aber die Hinterhüften schwarz, deren Schenkel an der Spitze, Schienen und Tarsen grösstenteils schwärzlich. Stigma im Vorderflügel braun. Körperlänge: 9–10 mm.

Fundort: Taihorin (1 ♀, 2 ♂, I und V, 1910).

Der Färbung nach *C. formosanus* UCH. sehr ähnlich, unterscheidet sich aber von ihm durch die schlanken Fühler.

Platylabus taihorinus sp. nov.

♂. Diese Art schliesst sich eng an die vorhergehende Art an, unterscheidet sich jedoch von ihr in den folgenden Merkmalen: 1) Fühler kräftig, ganz schwarz. 2) Das 2te Glied des Kiefertasters nicht auffallend

gross. 3) Gastrocölen tief eingedrückt. 4) Schildchen grob und stark punktiert. 5) Wangen schwarz. 6) Stigma schwärzlich. Körperlänge: 10 mm.

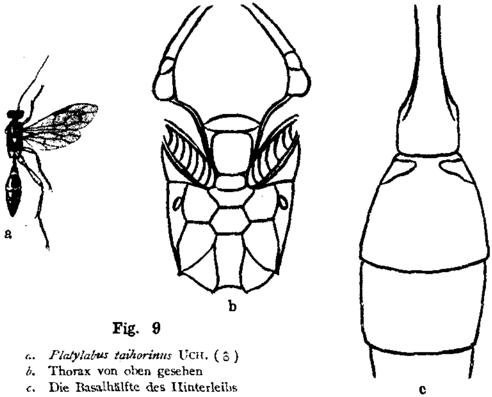


Fig. 9

a. *Platylabus taihorinus* UCH. (♂)
b. Thorax von oben gesehen
c. Die Basalhälfte des Hinterleibs

Fundorte: Taihorin (2 ♂, V, 1910); Amping (1 ♂, V, 1910); Yakanron (1 ♂, I, 1927, K. KIKUCHI).

Der Holotypus in der Sammlung des entomologischen Museums der kaiserlichen Hokkaido Universität zu Sapporo.

Neotypus lapidator F. f. *taiwanus* UCH.

Neotypus taiwanus UCHIDA, Ins. Mats., III, p. 174, ♂ (1929).

Fundorte: Kankau (2 ♀, VI, 1912); Amping (1 ♂, 4 ♀, am 7. VII, 1912).

Neotypus flavipes sp. nov.

♀. Kopf von vorn gesehen fast rundlich, glatt, glänzend, hinter den Augen etwas rundlich verschmälert; Gesicht leicht aufgetrieben, zerstreut fein punktiert; Clypeus nicht vom Gesicht getrennt, vorn in der Mitte zahnartig vorspringend; Mandibeln dick, mit 2 ungleichen Zähnen. Fühler fadenförmig, kurz, fast so lang wie Kopf und Thorax zusammen. Thorax robust; Mesonotum und -pleuren fein und Metapleuren grob punktiert; Schildchen rundlich konvex, glatt, beiderseits bis zur Spitze gerandet;

Propodeum sehr kurz, hinten steil abfallend, runzelig, Area superomedia halbkreisförmig. Hinterleib länglich oval; Postpeticlus glatt, das 2te und 3te Segment dicht fein runzelig punktiert; Gastrocölen tief und gross. Beine ziemlich dick, besonders die hintersten; Klauen deutlich gekämmt; Schienenendsporen länger als die halbe Länge des Metatarsus. Flügel sub-

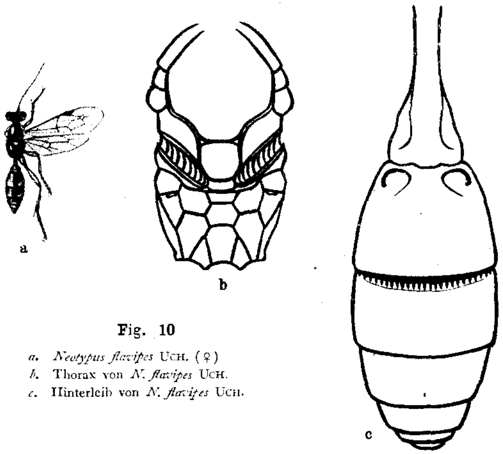


Fig. 10

a. *Neotypus flavipes* UCH. (♀)
b. Thorax von *N. flavipes* UCH.
c. Hinterleib von *N. flavipes* UCH.

hyalin; Stigma bräunlich; Nervulus interstitial; Areola fünfseitig; Nervellus unter der Mitte gebrochen, mit undeutlichem Längsnerv.

Schwarz. Fühler braun. Gesicht und Clypeus, mit Ausnahme der Mitte, Schläfen, Schaft unten, Mandibeln, je eine Linie vor und unter den Flügeln, Schildchen, Hinterschildchen, Vorder- und Mittelhüften, Hinterhüften oben, Petiolus, das 2te und 3te Segment je am Hinterwinkel und die übrigen Segmente je am Endrand rein gelb; Beine gelblichrot, die Hintertrochantern, ihre Schenkel an der Spitze, ihre Schienen und Tarsen schwärzlichbraun. Körperlänge: 10 mm.

♂. Fühler oben schwärzlich, unten braun. Das erste Segment des Hinterleibs schwarz, nur am Endrand gelb. Flügel bräunlich hyalin. Stimmt sonst mit dem Weibchen überein.

Das Tierchen steht *N. melanocephalus* Gm. ziemlich nach, weicht aber von ihm durch die kleine Gestalt ab.

Fundorte: Taihorin (1 ♂, I, 1910); Kaunkau (1 ♀, VI, 1912).

Takanona alboannulata sp. nov.

♀, ♂. Kopf quer, etwas breiter als der Thorax, dicht grob punktiert, hinter den Augen stark verschmälert; Stirn runzelig punktiert, leicht aufgetrieben; Clypeus vom Gesicht deutlich getrennt, glatt, glänzend, vorn abgerundet; Mandibeln mit 2 ungleichen Zähnen; Wangen kurz. Fühler kürzer als der Körper, fadenförmig, schlank, das erste Geisselglied länger als das 2te; Schaft oval, hinten tief ausgeschnitten. Thorax dicht punktiert und dicht fein weisslich behaart; Schildchen flach, die Basalgrube grob längsgerunzelt; Area superomedia deutlich länger als breit, hexagonal, Costula schwach. Hinterhüften des Weibchens unten unbewehrt. Hinterleib schlank, länger als Kopf und Thorax zusammen; Petiolus glatt, glänzend, das 2te Segment fein längsgerunzelt, deutlich länger als breit, an der Basis breit eingedrückt; Thyridien gross; das 3te Segment quadratisch, fein runzelig punktiert, die übrigen quer. Bohrer kurz vorragend. Flügel bräunlich hyalin; Stigma und Nerven gelbbraun; Areola 5-seitig; Nervulus interstitial; Nervellus postfurkal, unter der Mitte kaum gebrochen.

Schwarz. Fühler an der Basis und der Schaft rot, in der Mitte weisslich und gegen die Spitze zu braun. Mandibeln gelbbraun; Palpen weisslichgelb. Beine rot, die Vorder- und Mittelhüften und ihre Trochantern gelb, die Hinterschenkel und -schienen an der Spitze schwärzlich. Hinterleib rot, aber vom 5ten Segment an schwarz, das 2te-4te Segment mehr oder weniger schwarz gefleckt. Körperlänge: 7-8 mm.

Fundorte: Taihorin (5 ♀, 5 ♂, IV, V, XI, XII, 1910); Kôsempo (1 ♂, V, 1912); Amping (1 ♂, V, 1910); Chosokei (1 ♂, 1914); Hokutô (1 ♂, IV, 1912); Chikutoki (1 ♂, am 21. V, 1911).

Diese Art verwandt mit *T. ishiyamana* Uch. (Journ. Fac. Agr., Hokkaido Imp. Univ., XVIII, p. 164, 1926), weicht aber von ihr durch die Färbung und Skulptur des Körpers ab.

Unterfamilie CRYPTINAE

Nipporicnus rufus sp. nov.

♀. Kopf glatt, hinter den Augen verengt; Scheitel schmal; Stirn und Gesicht spärlich fein punktiert, die erstere in der Mitte mit schwacher Längsleiste, das letztere beiderseits längsgefurcht, dazwischen leicht aufge-

trieben; Clypeus beiderseits tief gefurcht, vorn abgestutzt; Labrum deutlich vorragend; Mandibeln mit normaler Bildung. Fühler fadenförmig, fast von Körperlänge. Thorax schmäler als der Kopf; Mesonotum fast glatt, matt, mit tiefen Parapsiden; Schildchen nicht gerandet; Pleuren runzelig punktiert; Propodeum dicht fein punktiert, mit 2 Querleisten; Luftlöcher lang gestreckt. Beine dünn und lang, besonders die hintersten. Flügel hyalin; Stigma und Radialzelle schmal und lang; Areola quer, den rücklaufenden Nerv hinter der Mitte aufnehmend; Nervulus vor der Gabel, Nervellus weit unter der Mitte gebrochen. Hinterleib fein punktiert, das erste Segment schwach gebogen, schlank und lang, der Postpetiolus etwas verbreitert, das 2te länger als breit, die übrigen quer. Bohrer schlank, fast von der halben Hinterleibslänge, nach oben gebogen, an der Spitze deutlich gekrümmt.

Schwarz. Fühler in der Mitte breit weiss geringelt, der Schaft dunkelbraun. Innere Augenränder weiss gesäumt. Gesicht, Clypeus, Mandibeln, Schläfen, Palpen, Tegulen, ein grosser Fleck auf dem Mesonotum, Labrum und Schildchen weisslichgelb; Beine und Thorax gelbrot; Mesonotum und

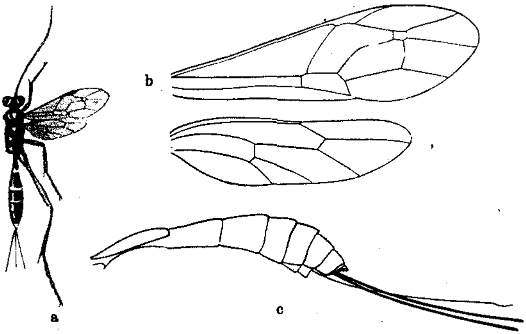


Fig. 11

a. Nipporicnus rufus UCH. (♀) *b.* Beide Flügel von *N. rufus* UCH.
b. Hinterleib von der Seite gesehen von *N. rufus* UCH.

Propodeum an der Basis schwarz; Pro- und Mesopleuren zum Teil schwärzlich; Hinterschenkel an der Spitze und ihre Schienen an Basis und Spitze zuweilen dunkel gefleckt, die hintersten Tarsen fast ganz weiss. Jedes

Hinterleibssegment am Hinterrand gelblich, der Petiolus gelbrot. Körperlänge: 13 mm.

♂. Fühler schwärzlichbraun, ohne weissen Ring. Körper schlanker als beim Weibchen. Stimmt sonst mit dem Weibchen überein. Körperlänge: 10–13 mm.

Fundorte: Kankau (2 ♀, IX, 1912; 3 ♂, V, 1912); Taihorin (3 ♂, IV, 1910).

Das Tier weicht von *N. tarsalis* MATS. durch die Färbung des Körpers und der Beine ab.

Acroricnus ambulator SM. f. **rufiabdominalis** UCH.

Acroricnus ambulator SMITH f. *rufiabdominalis* UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, 167, ♀ ♂ (1931).

Fundorte: Hôzan (1 ♀, am 7. IX, 1910); Taihorin (1 ♀, am 7. VII, 1911).

Cryptus karenkoensis UCH.

Cryptus karenkoensis UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 169, Taf. II, fig, 10, ♀ (1913).

Fundorte: Taihorin (3 ♀, am 7. XI, 1911); Kôsempo (3 ♀, am 7. X, 1911); Hôzan (1 ♀, II, 1910).

Cryptus tuberculatus sp. nov.

♀. Stirn deutlich gerunzelt; Gesicht in der Mitte höckerartig aufgetrieben, dicht runzelig punktiert; Clypeus vorn abgestutzt, Mandibeln ziemlich kräftig, mit 2 gleichen Zähnen. Fühler fadenförmig, fast von Körperlänge; Schaft oval, hinten tief ausgeschnitten. Thorax dicht fein runzelig punktiert; Mesonotum mit deutlichen Parapsidenfurchen; Scutellum länger als breit, schwach rundlich konvex, an der Basis seitwärts gerandet; Propodeum hinter der Mitte grob quergerunzelt, die Seitenzähne gross, die Vorderleiste in der Mitte undeutlich; Luftlöcher gross, länglich elliptisch; Epomia deutlich angedeutet. Flügel hyalin; Areola sehr gross, mit parallelen Seiten; Ramellus klein; Nervulus interstitial. Beine und Hinterleib schlank und lang; das erste Hinterleibssegment kaum punktiert, die Luftlöcher etwas hinter der Mitte liegend, die übrigen Segmente sehr fein punktiert. Bohrer fast so lang wie der Petiolus.

Schwarz und matt, Fühler in der Mitte, Stirnränder, Gesicht, Clypeus, Mandibeln, Palpen, Hals oben, Tegulen, Schulter und die Spitze des Schildchens gelblichweiss; Gesicht zum Teil, Vorderrand des Clypeus und die

Spitze der Mandibeln schwarz; Propodeum hinten und die 4 Vorderbeine bräunlichgelb, die Hinterbeine schwärzlichbraun, ihre Tarsen in der Mitte weiss. Jedes Hinterleibssegment am Endrand schmal hell gesäumt. Körperlänge: 16–17 mm.

Fundort: Taihorin (1 ♀, I, 1910; 1 ♀, am 7. XI, 1911).

Die Art unterscheidet sich von den übrigen Arten dieser Gattung durch die grosse Areola und das in der Mitte aufgetriebene Gesicht.

Cryptus suisharionis sp. nov.

♀. Kopf hinter den Augen rundlich verschmälert; Scheitel ziemlich aufgetrieben; Stirn und Fühlergruben glatt und glänzend; Gesicht und Clypeus runzelig punktiert. Fühler fadenförmig, fast von Körperlänge. Mesonotum kaum punktiert, mit tiefen Parapsiden; Schildchen flach, lang, beiderseits bis zur Mitte gerandet; Epomia kräftig; Pleuren und Propodeum grob gerunzelt, das letztere mit grossen Seitenzähnen; Luftlöcher linear. Areola im Vorderflügel sehr gross, fünfseitig, mit parallelen Seiten. Beine normal. Das erste Hinterleibssegment glatt, das 2te und 3te fein punktiert; Gastrocölen undeutlich. Bohrer fast von Körperlänge: 12–15 mm.

Schwarz und matt. Fühler in der Mitte, Gesicht, Clypeus, Wangen, Schläfen, Mandibeln mit Ausnahme der Spitze, Palpen, Stirnränder, beide Schildchen, Halsrand, ein Makel auf dem Mesonotum, je eine Linie unter den Tegulen und die Nähte des Thorax gelblichweiss. Propodeum hinten und die Vorder- und Mittelbeine gelblichbraun; Hinterbeine und Hinterleib braun, der Petiolus, die Hinterhüften zum Teil sowie auch das 2te und 3te Segment an der Basis schwärzlich.

Fundort: Suishario (4 ♀, X, 1911).

Der Form und Färbung nach der folgenden Art sehr ähnlich, unterscheidet sich aber von ihr durch die grosse, pentagonale Areola im Vorderflügel und das beiderseits bis zur Mitte gerandete Schildchen.

Apocryptus issikii sp. nov.

♀, ♂. Kopf hinter den Augen etwas rundlich verschmälert; Scheitel breit; Stirn dicht punktiert; Fühlergruben ziemlich tief nierdergedrückt; Gesicht flach, quer, kaum punktiert; Mandibeln dick, mit gleichen Zähnen. Fühler ziemlich kräftig, fadenförmig. Thorax matt; Mesonotum spärlich fein punktiert; Parapsiden tief; Schildchen flach, beiderseits nicht gerandet; Pleuren zum Teil runzelig; Epomia kräftig; Propodeum runzelig punktiert, die Seitenzähne klein, die Luftlöcher linear. Flügel bräunlich hyalin; Stigma und Radialzelle verlängert, der Radialendabschnitt in der Mitte

gebogen; Areola pentagonal, nach oben etwas konvergierend; Nervulus interstitial. Beine schlank. Hinterleib lang, das erste Segment glatt, mit einzelnen Punkten, der Postpetiolus in der Mitte längsgefurcht, das 3te und 4te Segment fein punktiert.

Schwarz und matt. Fühler in der Mitte, Gesicht, Clypeus, Stirnränder, Wangen, Palpen, Halsrand, Schulter, Tegulen an der Basis, je ein Fleck unter den Flügeln, Schildchen, Postschildchen, Propodeum hinten in der Mitte, Vorder- und Mittelhüften, ihre Trochantern unten, die hintersten Hüften oben zum Teil und die Hintertarsen, mit Ausnahme des Metatarsus, weisslich. Beine und Hinterleib rötlichbraun, der Petiolus, das 2te und 3te Segment an der Basis, alle Hüften und Trochantern zum Teil, die Hinterschienen an der Spitze und ihre Metatarsen schwärzlich. Stigma im Vorderflügel schwarzbraun. Körperlänge: 15 mm.

Fundorte: Ranrun (1 ♂, am 11. III, 1926, S. ISSIKI); Polisha (1 ♀, am 7. IV, 1912, H. SAUTER).

Der Holotypus in der Sammlung des entomologischen Museums der kaiserlichen Hokkaido Universität zu Sapporo und der Allotypus in der Sammlung des entomologischen Museums in Berlin-Dahlem.

In der Färbung verwandt mit *C. kankoensis* UCH. sehr ähnlich, unterscheidet sich jedoch von ihm durch den aufgetriebenen Scheitel.

Apocryptus gen. nov.

Kopf quer, hinter den Augen mehr oder weniger rundlich verschmälert, aber der Scheitel mehr oder minder aufgetrieben, hinter den Ocellen ziemlich breit; Wangen lang; Clypeus vorn abgestutzt, ohne Zahn; Mandibeln kräftig, mit gleichen Zähnen; Palpen schlank. Parapsidenfurchen tief; Schildchen flach; Propodeum mit 2 Querleisten und Seitenzähnen, die Luftlöcher lang gestreckt. Beine schlank, die Vorderschienen des Weibchens etwas aufgeblasen, an der Basis aber eingeschnürt. Hinterleib lang, das erste Segment in der Mitte gebogen, die Luftlöcher fast in der Mitte liegend. Stigma und Radialzelle lang, schmal; Areola pentagonal; Diskokubitalnerv nicht gebrochen, ohne Ramellus; Nervulus interstitial; Nervellus weit unter der Mitte gebrochen.

Genotypus: *Apocryptus issikii* UCH.

Diese Gattung verwandt mit *Cryptus* F., aber unterscheidet sich von ihm durch die folgenden Merkmale: 1) Scheitel deutlich aufgetrieben. 2) Diskokubitalnerv nicht gebrochen und der Ramellus fehlt ganz. 3) Petiolus nicht gekrümmt, leicht gebogen, die Luftlöcher fast in der Mitte liegend.

Paracryptus formosanus sp. nov.

♀. Kopf quer, hinter den Augen stark verengt; Stirn und Gesicht fein runzelig; Palpen lang. Mesonotum dicht fein lederartig punktiert, mit zerstreuten groben Punkten; Schildchen an der Basis gerandet; Pleuren und Propodeum auffallend dicht grob gerunzelt; Luftlöcher linear; Epomia schwach; Parapsiden fast fehlend. Flügel hyalin; Stigma braun. Beine kräftig. Hinterleib länglich oval, das erste Segment zerstreut und die übrigen dicht fein punktiert. Bohrer fast von Petioluslänge. Antennen fadenförmig, fast so lang wie der Körper, einige Basalgeisselglieder viel länger als breit; Schaft oval, hinten tief ausgeschnitten. Körperlänge: 10–11 mm.

Schwarz und matt. Fühler in der Mitte weiss. Palpen gelbbraun. Beine gelblich oder rötlich braun, aber die hintersten dunkelbraun, besonders die Tarsen. Jedes Hinterleibssegment mit braunem schmalen Hinterrand, das Hinterleibsende weiss. Tegulen, Schildchen und Flügelwurzel braun.

♂. Hinterleib linear. Gesicht ganz und die Vorder- und Mittelbeine gelbbraun. Schildchen, Propodeum, Pleuren zum Teil und der Hinterleib grösstenteils bräunlich.

Fundorte: Kankau (2 ♀, am 7. IV, 1912); Tainan (1 ♂, 22. VII, 1911).

Unterscheidet sich von *P. orientalis* Uch. durch die roten Beine.

Caenocryptus taihorinus sp. nov.

♀. Kopf dicht punktiert, hinter den Augen verschmälert. Fühler fadenförmig, das erste Geisselglied viel länger als das folgende; Schaft oval. Thorax dicht fein punktiert wie beim Kopf; Parapsiden tief angedeutet; Schildchen flach, nicht gerandet; Propodeum mit 2 Querleisten, wovon die hintere undeutlich ist. Flügel hyalin; Areola länger als breit, mit fast parallelen Seiten; Nervulus vor der Gabel. Das erste Hinterleibssegment lederartig fein punktiert. Bohrer fast von der Petioluslänge. Vorderschienen etwas verdickt und an der Basis eingeschnürt. Körperlänge: 11 mm.

Schwarz und matt. Fühler in der Mitte weiss. Gesicht mit Ausnahme der Mitte, je ein kleiner Fleck auf den Wangen und Mandibeln, Halsrand, beide Schildchen, Tegulen, je ein Makel vor und unter den Flügeln, Vorder- und Mittelhüften, breites Band des Propodeums, Hintertarsen in der Mitte (das 2te und 3te Glied), das erste - 5te Hinterleibssegment je am Hinterrand schmal und die 2 Endsegmente fast ganz gelblichweiss. Mesopleuren

zuweilen weiss gefleckt; Propodeum, Beine und Petiolus rot, aber die Hinterbeine zum Teil schwärzlich.

Fundort: Taihorin (2 ♀, IV, 1910).

Die Art ähnelt sehr dem *C. tamahonis* UCH. (Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 171, Taf. II, fig. 8, ♀, 1931), aber das Gesicht, das Propodeum und die Hintertarsen sind weiss gefleckt.

Goryphus takanoi UCH.

Mesostenus (Mesostenus) takanoi UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 185, Taf. II, fig. 6, ♀ ♂ (1931).

Fundorte: Kankau (1 ♀, 3 ♂, am 7. IV, 1912); Hôzan (1 ♀, 1 ♂, am 7. IX, 1910); Tainan (1 ♂, am 7. V, 1912); Amping (1 ♀, am 7. VII, 1912); Chosokei (1 ♂, 1914).

Goryphus robustus sp. nov.

♀. Sehr robuste Art. Kopf hinter den Augen stark geradlinig verschmälert; Stirn und Gesicht dicht gerunzelt, flach; Clypeus und innere Augenränder glatt und glänzend, die letzteren etwas aufgetrieben, der erstere rundlich gewölbt; Mandibeln dick und kurz, mit 2 ungleichen Zähnen, der obere länger. Fühler kürzer als der Körper, fadenförmig. Thorax kräftig, fast 2 mal so lang wie breit; Mesonotum fein pubescent und runzelig; Parapsiden tief; Schildchen rundlich, glatt, nicht gerandet; Pleuren und Propodeum dicht grob punktiert, das letztere sehr kurz, hinten steil abfallend, die Vorderquerleiste deutlich und die Hinterquerleiste nur an jeder Seite angedeutet; Luftlöcher länglich. Hinterleib länglich oval; Petiolus glatt, der Postpetiolus deutlich breiter als lang, das 2te und 3te Segment dicht fein punktiert, die übrigen fast glatt. Bohrer ein Drittel des Hinterleibs. Areola pentagonal; Nervulus interstitial.

Fig. 12
Goryphus robustus UCH. (♀)

Schwarz. Antennen in der Mitte, innere Augenränder breit, Gesicht beiderseits, Clypeus, Wangen, Mandibeln mit Ausnahme der Spitze, Palpen, Halsrand, Tegulen, Schultern, je ein Makel unter den Flügeln, beide Schildchen, je ein kleiner Fleck am Basalkiel des Schildchens, Propodeum hinten beiderseits, Vorderhüften und -trochantern, Hintertarsen, mit Ausnahme des Endglieds, und jedes Hinterleibssegment am Hinterrand weiss gefärbt. Weisses Band des 4ten und 5ten Segments zuweilen in der Mitte gebrochen. Beine gelbrot, die Hinter-

schenkel am Ende und ihre Schienen an Basis und Spitze schwärzlich. Flügel hyalin; Stigma schwärzlich. Körperlänge: 9–11 mm.

Fundort: Kankau (4♀, am 7. V, 1912; 1♀, V, 1912; 1♀, VI, 1912).

Unterscheidet sich von *G. tuberculatus* UCH. durch die Bildung des Propodeums.

Goryphus horeiensis sp. nov.

♀. Kopf nach hinten stark verengt; Stirn fein gerunzelt; Gesicht runzelig punktiert; Clypeus rundlich konvex, glatt. Fühler mit normaler Bildung. Thorax ziemlich kurz, fein pubescent; Mesonotum spärlich fein runzelig punktiert; Schildchen glatt, glänzend, nicht gerandet, quadratisch; Brustseiten und Propodeum dicht gerunzelt; Speculum glatt und glänzend; Propodeum mit einer kräftigen Basalleiste und 2 grossen Seitenzähnen. Das erste Hinterleibssegment glatt und glänzend, das 2te und 3te matt, punktiert, die übrigen glatt. Bohrer fast von 1/3 der Hinterleibslänge. Flügel hyalin; Areola ziemlich klein; Nervulus vor der Gabel.

Schwarz. Fühler in der Mitte, innere Augenränder breit, Clypeus, ein Makel in der Mitte des Gesichts, Mandibeln mit Ausnahme der Spitze, Palpen, Hals oben, Schulter, je eine Linie unter den Tegulen, beide Schildchen, Tegulen, Basalkiel des Schildchens zum Teil, Propodeum hinten beiderseits, Vorder- und Mittelhüften, ihre Trochantern, Hintertarsen in der Mitte (das 2te und 3te Glied), das erste und 2te Segment des Hinterleibs am Endrand und das Hinterleibsende weiss. Beine rot; Tarsen und Schienen gelbrot, die Hinterschenkel an der Spitze, ihre Schienen an Basis und Spitze und ihre Tarsen schwärzlich. Stigma dunkelbraun. Körperlänge: 9 mm.

♂. Körper sehr schlank. Fühler und Hintermetatarsus ganz schwarz. Gesicht grösstenteils weiss. Sonst mit dem Weibchen ganz übereinstimmend.

Fundort: Taihorin (1♀, 2♂, am 7. XII, 1911).

Das Tier steht der vorigen Art sehr nahe, unterscheidet sich aber von ihr durch die schlanke Gestalt und die Zeichnung des Gesichts und Hinterleibs.

Goryphus hyalinoides UCH.

Mesostenus (*Mesostenus*) *hyalinoides* UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 186, Taf. II, fig. 12, ♀ (1931).

Fundort: Taihorin (1♀, am 22. VII, 1911).

Goryphus kurarensis sp. nov.

♂. Kopf glänzend, hinter den Augen verengt; Gesicht fein punktiert; Mandibeln dick; Wangen aufgetrieben. Fühler fadenförmig, fast von Körperlänge, dicht fein pubescent. Thorax glänzend; Mesonotum kaum punktiert; Parapsidenfurchen deutlich; Schildchen nicht gerandet, flach; Mesopleuren glatt; Propodeum mit 2 Querleisten, runzelig, aber nur an der Basis glatt; Luftlöcher klein und rundlich. Flügel hyalin; Stigma dunkelbraun; Areola pentagonal, ziemlich klein, nach oben verengt; Nervulus vor der Gabel; Nervellus unterhalb der Mitte gebrochen, postfurkal. Hinterleib dicht fein punktiert, matt, aber nur das erste Segment glatt und glänzend, jedes Segment am Endrand ziemlich aufgetrieben, besonders das letzte.

Schwarz und glänzend. Fühler dunkelbraun oder braun. Gesicht, Clypeus, Mandibeln, Palpen, Wangen, Stirnränder breit, Tegulen, Prothorax, beide Schildchen, Schulter, je ein Fleck unter den Tegulen, Hintertarsen, mit Ausnahme von Spitze und Basis, und jedes Hinterleibssegment am Ende breit weiss gefärbt. Mesothorax an der Endhälfte, Propodeum, Beine und Petiolus gelbrot; Hinterschienen mehr oder minder und ihre Tarsen an Basis und Spitze schwärzlichbraun. Körperlänge: 6–9 mm.

Fundorte: Kuraru (1 ♂, am 20. III, 1926, S. Issiki); Taihorin (7 ♂, VII, XI, 1911); Kankau (1 ♂, VI, 1912); Kôsempo (1 ♂, V, 1912); Amping (1 ♂, I, 1910).

Der Holotypus in der Sammlung des entomologischen Museums der kaiserlichen Hokkaido Universität in Sapporo. Unterscheidet sich von *G. longicornis* Ishida durch den nicht getrübtene Flügel.

Goryphus suishanus sp. nov.

♂. Der Form, Skulptur und Färbung nach der vorhergehenden Art sehr ähnlich, aber in den folgenden Charakteren verschieden: 1) Schaft unten weiss. 2) Gesicht beiderseits schwarz; Wangen und Stirnränder nicht weiss gefleckt. 3) Vorder- und Mittelhüften und deren Trochantern weisslichgelb. 4) Schildchen rötlich. 5) Schulter nicht weiss.

Fundorte: Suisha (3 ♂, X, 1911); Amping (1 ♂, V, 1911); Hôzan (1 ♂, II, 1910); Taihorin (1 ♂, V, 1910).

Goryphus nigribasalis Uch.

Mesostenus (*Mesostenus*) *nigribasalis* Uchida, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 187, ♀ (1931).

Fundorte: Teraso (3 ♀, IV, 1909); Kôsempo (1 ♀, III, 1908); Hôzan (1 ♀, am 7. IX, 1910).

Goryphus taihorinensis sp. nov.

Der Färbung und Form nach *G. ultimus* SZÉPL. sehr ähnlich, aber der Flügel ganz hyalin, die Hinterschienen an der Basis und ihre Tarsen nicht weiss gefleckt und die Vorderschienen nicht aufgeblasen.

♀. Kopf nach hinten deutlich verschmälert; Stirn in der Mitte fein runzelig; Gesicht fein punktiert. Fühler fast von Körperlänge. Mesonotum glatt, in der Mitte gerunzelt; Parapsiden tief; Schildchen nicht gerandet; Pleuren und Propodeum dicht gerunzelt. Flügel hyalin; Areola klein, pentagonal. Hinterleib dicht punktiert, matt, das erste Segment glatt und glänzend. Bohrer so lang wie das erste Segment. Beine ziemlich schlank.

Schwarz. Fühler in der Mitte, Clypeus zum Teil, Mandibeln, Palpen, Vorder- und Mittelhüften, ihre Trochantern, je ein Fleck unter den Tegulen, beide Schildchen, das erste und 2te Hinterleibssegment am Endrand breit, das 5te und 6te am Endrand schmal und das Ende des Hinterleibs ganz weiss. Beine, Propodeum, ein Makel hinter dem Hinterflügel und das erste Hinterleibssegment blutrot, die Hintertrochantern an der Basis, ihre Schenkel an der Spitze, ihre Schienen an Basis und Spitze und die Tarsen dunkelbraun. Körperlänge: 8,5 mm.

Die Art unterscheidet sich von *G. nigribasalis* UCH. durch den ganz rot gefärbten Petiolus.

Fundort: Taihorin (1 ♀, V, 1910).

Goryphus tuberculatus sp. nov.

♀. Kopf deutlich quer, hinten geradlinig verschmälert; Stirn und Gesicht runzelig punktiert; Clypeus gewölbt, glatt. Antennen fadenförmig, etwas kürzer als der Körper. Thorax gedrungen, matt; Mesonotum fein runzelig punktiert; Parapsiden vorn stark angedeutet; Schildchen rundlich erhaben, glatt, nicht gerandet; Pleuren und Propodeum grob netzartig gerunzelt, letzteres sehr kurz, hinten steil abfallend, mit schwacher Vorderquerleiste, hinten beiderseits mit einem grossen dicken Zahn. Flügel hyalin, unter dem Stigma bläunlich getrübt; Areola pentagonal. Hinterleib länglich elliptisch, dicht punktiert, das erste Segment glatt; Thyridien gross, gestreift. Bohrer fast so lang wie das erste Segment.

Schwarz. Fühler in der Mitte, Stirnränder, Clypeus, Mandibeln, Palpen, Halsrand, Schulter, Tegulen, je ein Makel unter den Flügeln, beide Schildchen, Vorder- und Mittelhüften, Propodeum hinten beiderseits, das erste-2te-5te Hinterleibssegment am Hinterrand und das Hinterleibsende (das

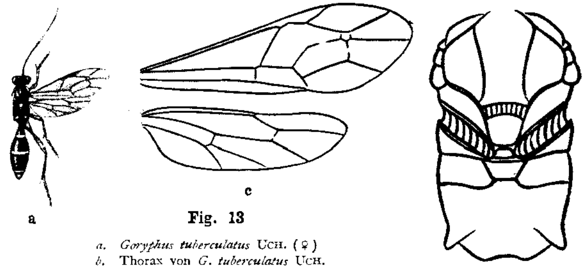


Fig. 13

a. *Goryphus tuberculatus* UCH. (♀)
b. Thorax von *G. tuberculatus* UCH.
c. Beide Flügel von *G. tuberculatus* UCH.

6te und 7te) weiss. Beine rot, die Hinterschenkel an der Spitze, ihre Schienen an Basis und Spitze und die Tarsen, mit Ausnahme des Metatarsus, dunkelbraun, die Hintermetatarsen und die Schienenendsporen weisslich. Körperlänge: 6–7 mm.

Fundort: Kankau (3 ♀, V, 1912).

Diese Art unterscheidet sich von den übrigen dieser Gattung verwandten Arten durch die Bildung des Propodeums.

Goryphus inornatus sp. nov.

♀. Das Tier steht der vorigen Art sehr nahe, unterscheidet sich aber von ihr durch die folgenden Merkmale: 1) Stirnränder, Clypeus, Halsrand und Schulter nicht weiss gefleckt. 2) Propodeum und Mesothorax hinten zum Teil rot, das erstere mit kleinen Seitenzähnen, oben weiss gefleckt. 3) Die Hinterschienenendsporen dunkel, ihre Tarsen grösstenteils weisslich. 4) Körper und Beine grösser. 5) Petiolus mehr oder weniger schwarz gefleckt. 6) Flügel mit dunklem Querband unter dem Stigma. Körperlänge: 8 mm.

Fundort: Kankau (2 ♀, V–VI, 1912).

Goryphus longicornis ISHIDA

Exetastes longicornis ISHIDA, Kansho-Meichu Chosa-Hokoku, I, p. 104; II, Pl. XIV, fig. 12, ♂ (1914).

Mesostenus transiens SZÉPLIGETI, Ann. Mus. Nat. Hung., XIV, p. 335, ♀ (1916).

Mesostenus (Mesostenus) longicornis UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 186, ♀ ♂ 1931).

Fundorte: Taihorin (1 ♂, 1912; 1 ♀, X, 1914; 1 ♂ und 2 ♀, V, 1910;

1 ♀, am 7. VI, 1911); Chosokei (2 ♀, 1914); Hôzan (2 ♂, am 7. IX, 1910); Taihoku (1 ♂, V, 1910); Amping (1 ♀ und 1 ♂, I, 1910); Tainan (3 ♀, 1909–1912).

Das Tier steht *G. basilaris* HOLMGR. aus China sehr nahe, unterscheidet sich aber von ihm durch die Zeichnung des Fühlers und des 6ten Segments des Hinterleibs.

Goryphus taiwanellus sp. nov.

♀. Kopf nach hinten verschmälert; Stirn in der Mitte und das Gesicht fein runzelig. Fühler schlank, kürzer als der Körper. Mesonotum lederartig punktiert, mit tiefen Parapsidenfurchen; Schildchen fein runzelig, beiderseits bis zur Mitte gerandet; Pleuren und Propodeum dicht gerunzelt, das letztere mit 2 Querleisten, die Seitenzähne klein. Flügel fast hyalin, mit

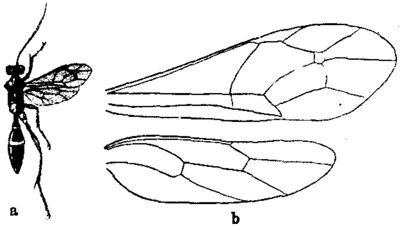


Fig. 14

a. Goryphus taiwanellus UCH. (♀)

b. Beide Flügel von *G. taiwanellus* UCH.

undeutlichem braunen Fleck in der Mitte; Areola klein, pentagonal. Beine schlank. Das 2te Hinterleibssegment punktiert, die übrigen fast glatt. Bohrer etwa von 1/3 der Hinterleibslänge.

Schwarz. Fühler an der Basalhälfte rötlichbraun, in der Mitte weiss. Mandibeln an der Basis mit weissem Fleck. Palpen weisslich. Mesothorax an der Endhälfte, Schildchen, Propodeum und das erste Hinterleibssegment nur an der Basis rot; Beine schmutzig rotbraun, die Vorderhüften und -trochantern weisslich, die Mittel- und Hinterhüften hellrot; Endrand des ersten und 2ten Segments und das Ende (das 7.–8. Segment) des Hinterleibs weiss. Körperlänge: 5–5,5 mm.

Fundort: Kankau (5 ♀, IV, V, VI, VII, 1912).

Unterscheidet sich von *G. longicornis* ISHIDA durch den schwarzen Petiolus und Hintertarsus.

f. ***rufithorax*** nov.

♀. Unterscheidet sich von der typischen Art durch den rot gefärbten Thorax und den kaum weiss gesäumten Postpetiolus.

Fundort: Tainan (1 ♀, IV, 1912; 1 ♀, am 7. V, 1912).

Goryphus opacus SZÉPL.

Mesostenus opacus SZÉPLIGETI, Ann. Mus. Nat. Hung., XIV, p. 335, ♀ (1916).

Mesostenus (*Mesostenus*) *opacus* UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 186, Taf. II, fig. 23, ♀ (1931).

Fundorte: Taihorin (3 ♀, V, 1910; 2 ♀, am 7. VII, 1911; 2 ♀, am 7. IX, 1911); Kôsempo (2 ♀, X, 1909); Terasô (3 ♀, IV, 1909); Kankau (1 ♀, am 7. IV, 1912); Amping (1 ♀, VIII, 1909).

Goryphus detritus HOLMGR.

Goryphus detritus HOLMGREN, Eugen, Resa Ins., p. 399, ♀ (1868).

Fundorte: Kankau (1 ♀, VIII, 1908; 3 ♀, V, VI, VII, 1912); Taihorin (1 ♀, am 7. VII, 1911); Terasô (1 ♀, IV, 1909).

Goryphus ultimus SZÉPL.

Mesostenus ultimus SZÉPLIGETI, Ann. Mus. Nat. Hung., XIV, p. 335, ♀ (1916).

Mesostenus (*Mesostenus*) *ultimus* UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 186, ♀ (1931).

Fundort: Kankau (1 ♀, VII, 1912).

Goryphus sauteri sp. nov.

♀. Körper ziemlich schlank. Kopf glänzend, nach hinten verengt, glatt; Stirn in der Mitte kaum gerunzelt; Gesicht fast glatt. Fühler schlank, kaum kürzer als der Körper. Mesonotum schwach glänzend, glatt, in der Mitte fein gerunzelt, mit tiefen Parapsidenfurchen; Schildchen glatt, nicht gerandet; Pleuren und Propodeum dicht fein runzelig, das letztere mit 2 schwachen Querleisten, die Seitenzähne undeutlich. Beine schlank. Flügel hyalin, mit dunklem Querband unter dem Stigma. Das 2te und 3te Hinterleibssegment dicht punktiert, das erstere ziemlich stark glänzend. Bohrer fast von 1/3 der Hinterleibslänge.

Schwarz. Fühler in der Mitte weiss, an der Basis dunkelbraun. Mandibeln, Vorderhüften und -trochantern, beide Schildchen, Tegulen, je ein Fleck unter den Tegulen, das erste und 2te Segment am Endrand und das Hinterleibsende (das 6te Segment am Endrand schmal und die übrigen ganz) weiss. Beine, Mesopleuren hinten, Propodeum und das erste Segment

rot; alle Tarsen, die Hinterschenkel an der Spitze und ihre Schienen an Basis und Spitze verdunkelt. Körperlänge: 7 mm.

Fundort: Taihorin (1 ♀, am 7. XI, 1911).

Unterscheidet sich von *G. ultimus* SZÉPL. durch die Färbung des Basalkieles des Schildchens.

Mesostenus (Mesostenus) taiwanus sp. nov.

♂. Gesicht fein punktiert. Antennen fein pubescent, fast von Körperlänge. Mesonotum dreilappig, kaum punktiert; Parapsiden sehr tief; Schildchen glatt, nicht gerandet; Mesopleuren zerstreut runzelig punktiert, das Speculum gross; Propodeum auffallend dicht grob punktiert, mit kräftiger Querleiste nahe der Basis. Hinterleib lang, mit parallelen Seiten, fein behaart und punktiert, das erste Segment fast glatt und glänzend. Flügel hyalin; Areola klein und quadratisch, der Aussennerv undeutlich. Körperlänge. 7–9 mm.

Schwarz. Antennen dunkelbraun. Stirnränder breit, Gesicht in der Mitte, Clypeus, Mandibeln mit Ausnahme der Endzähne, Prothorax, Tegulen, je ein Fleck unter den Tegulen, Schildchen und Hintertarsen weiss; Beine und Propodeum gelbrot, die Vorder- und Mittelhüften und ihre Trochantern gelblich, die Hintertrochantern, ihre Schenkel an der Spitze, ihre Schienen und die Basis der Tarsen schwärzlich, die Hinterschienen an der Basis bräunlich; das erste–4te Segment je am Hinterrand und das letzte ganz weisslichgelb, das erste Segment an der Basalhälfte gelbrot, in der Mitte dunkel gefleckt.

Fundorte: Kankau (4 ♂, am 7. und 22. IV, 1912); Amping (1 ♂, V, 1910); Taihorin (1 ♂, am 7. XII, 1911).

Der Färbung nach *Goryphus kuraensis* UCH. sehr ähnlich, weicht aber von ihm durch das nicht aufgetriebene Hinterleibssegment ab.

♀. Kopf quer, etwas breiter als der Thorax, hinter den Augen geradlinig verschmälert; Stirn gerunzelt; Gesicht fein runzelig punktiert. Fühler kaum kürzer als der Körper, am Ende verdünnt. Mesonotum dicht fein punktiert, ganz matt, mit deutlich tiefen Parapsidenfurchen; Pleuren und Propodeum grob gerunzelt, das letztere an der Basis fein punktiert, die Vorderquerleiste kräftig, die Seitenzähne ziemlich gross; Schildchen flach gewölbt, glatt, nicht gerandet. Hinterleib lang, fast linear, das 2te und 3te Segment matt und dicht punktiert, die übrigen glatt und glänzend. Bohrer fast vom ersten Segment. Flügel hyalin; Areola klein, subpentagonal. Beine schlank.

Schwarz. Antennen dreifarbig (an der Basis rötlichbraun, in der Mitte

weiss und an der Spitze schwärzlich). Stirn- und Scheitelränder breit, Gesicht in der Mitte, Clypeus, Mandibeln, Schulter, Tegulen, je ein Fleck unter den Tegulen und hinter den Flügeln, Schildchen, Vorder- und Mittelhüften, ihre Trochantern, die Hintertarsen, Propodeum hinten, das erste und 2te Hinterleibssegment am Hinterrand sowie auch das Hinterleibsende (das 5te–7te Segment am Endrand schmal) gelblichweiss. Beine gelbrot, die hintersten mehr rot, ihre Schenkel an der Spitze und die Schienen grösstenteils dunkelbraun, aber die letzteren in jeder Mitte gelblichweiss gefleckt. Petiolus rot, das 2te und 3te Segment dunkelbraun. Körperlänge: 8,5 mm.

Fundort: Taihorin (1 ♀, am 7. XII, 1911).

Mesostenus **(*Mesostenus*)** ***suisharionis*** sp. nov.

♀. Kopf nach hinten stark verengt; Stirn eingedrückt, querrunzelig; Gesicht unregelmässig fein gerunzelt. Antennen etwas kürzer als der Körper. Thorax ganz matt, weisslich fein pubescent; Mesonotum mit tiefen Parapsiden, lederartig fein punktiert; Scutellum deutlich länger als breit, an der Basis seitlich gerandet; Pleuren grob quergerunzelt; Propodeum dicht gerunzelt, mit 2 Querleisten, die Seitenzähne deutlich lang und gross. Hinterleib matt, lederartig fein punktiert. Bohrer fast von 1/3 der Hinterleibslänge. Flügel subhyalin; Areola pentagonal; Radialzelle ziemlich lang, der Endabschnitt des Radius wellenförmig gekrümmt. Körperlänge: 11 mm.

Schwarz. Fühler in der Mitte weiss geringelt. Mandibeln in der Mitte bräunlich; Palpen und Vorderhüften und -trochantern gelblichweiss; Propodeum, Mesothorax hinten und Beine blutrot, die Hinterbeine zum Teil schwärzlich, ihre Schienen nahe der Basis und die Trochantern in der Mitte weisslich; Schildchen gelbrot. Das erste und 3te Segment am Hinterrand und das Hinterleibsende weiss.

Fundort: Suishario (1 ♀, X, 1911).

Unterscheidet sich von *G. albosignatus* Szépl. durch die Färbung des Schildchens und Propodeums.

Mesostenus **(*Mesostenus*)** ***albosignatus*** Szépl.

Mesostenus albosignatus Szépligeti, Ann. Mus. Nat. Hung., XIV, p. 333, ♀ (1916).

Mesostenus (Mesostenus) albosignatus Uchida, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 186, ♀ (1931).

Fundorte: Kôsempo (2 ♀, II, 1910); Hôzan (1 ♀, am 7. IX, 1910); Terasô (1 ♀, IV, 1909); Suishario (1 ♀, X, 1911); Taihorin (2 ♀, am 7. VII, 1911).

Mesostenus (Mesostenus) subpentagonalis UCH.

Mesostenus (*Mesostenus*) *subpentagonalis* UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 183, Taf. II, fig. 4, ♀ (1931).

Fundorte: Suishario (2 ♀, X, 1911); Taihorin (1 ♀, V, 1910; 2 ♀, am 7. XI und XII, 1911).

Mesostenus (Mesostenus) concavus UCH.

Mesostenus (*Stenarella*) *concavus* UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 182, Taf. II, fig. 15, ♀ ♂ (1931).

Fundort: Taihorin (1 ♂, IV, 1910).

Stenaraeoides gen. nov.

Kopf hinter den Augen schräg verschmälert, fast so breit wie Thorax; Stirn ohne Dorn oder scharfen Kiel oberhalb der Fühler, aber mit einer schwachen Leiste in der Mitte; Gesicht quer; Clypeus vom Gesicht schwach getrennt, vorn in der Mitte leicht ausgerandet; innere Augenränder parallel; Wangen nicht aufgetrieben, der Hinterrand der Wangen mehr oder weniger lamellenartig vorspringend; Mandibeln kräftig, mit 2 gleichen Zähnen; Occiput scharf gerandet. Fühler mässig dick, etwas kürzer als der Körper, hinter der Mitte schwach erweitert, mit weissem Ring, der Schaft rundlich oval, hinten tief ausgeschnitten; Fühler beim Männchen so lang wie oder etwas länger als der Körper, gegen die Spitze zu verdünnt, in der Mitte nicht erweitert. Thorax robust, etwa 2½ mal so lang wie breit; Parapsiden tief angedeutet, Schildchen flach, an der Basis gerandet; Propodeum kurz und robust, dicht grob gerunzelt, hinten schräg abfallend, mit nur vorderer Querleiste, die Seitenzähne sehr gross, die Luftlöcher weit hinter der Mitte und weiter von einander als von der Spitze des Segments, das 2te Segment etwas quer, die übrigen deutlich quer. Bohrer kürzer als der Hinterleib. Areola im Vorderflügel deutlich breiter als hoch und nach aussen zu erweitert wie bei der Untergattung *Stenaraeus* THOMS. von *Mesostenus*, den rücklaufenden Nerv nahe dem Ende aufnehmend; Radialzelle gestreckt, der Endabschnitt mehr oder minder gekrümmt; Nervellus weit unterhalb der Mitte gebrochen.

Genotypus: *Mesostenus octocinctus* ASH. = *Stenaraeoides octocinctus* (ASH.)

Diese Gattung verwandt mit der Gattung *Mesostenus*, unterscheidet sich von ihr durch die Gestalt des 2ten Segments des Hinterleibs und die Charaktere des Propodeums.

Stenaraeoides octocinctus ASH.

Mesostenus octocinctus ASHMEAD, Proc. U. S. Nat. Mus., XXX, p. 176, ♀ (1906); UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 319, ♀ ♂ (1930).

Mesostenus (Stenaraeus) octocinctus UCHIDA, l. c., XXX, p. 180 (1931).
Stenaraeus formosanus UCHIDA (nec. SZÉPLIGETI), l. c., XXX, p. 180, ♂ (1931).

Fundorte: Kankau (1 ♀ und 3 ♂, VII, VIII, 1912); Taihorin (♀, am 7. VII, 1911). Diese Art ist in Südjapan sehr häufig.

Stenaraeoides rufipes SZÉPL.

Stenaraeus rufipes SZÉPLIGETI, Ann. Mus. Nat. Hung., XIV, p. 325, ♀ (1916).
Stenaraeus formosanus SZÉPLIGETI, l. c., XIV, p. 325, ♂ (1916).
Mesostenus (Stenaraeus) rufipes UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 180, ♀ ♂ (1931).

Fundorte: Taihorin (6 ♀, 2 ♂ IV, 1910; 5 ♀, 12 ♂, VII, VIII, XI, 1911); Kosempo (1 ♂, am 7. XII, 1911). Diese Art ist in Formosa häufig.

Stenaraeoides ampingensis sp. nov.

♂. Kopf etwas breiter als der Thorax, nach hinten geradlinig verschmälert; Stirn glatt, glänzend; Gesicht schwach gewölbt; Mandibeln schlank, mit ungleichen Zähnen, der untere kleiner. Fühler dicht fein pubescent. Mesonotum grob punktiert; Mesopleuren in der Mitte runzelig; Propodeum grob gerunzelt. Flügel hyalin; Areola klein, deutlich quer; Endabschnitt des Radius an der Basis schwach gekrümmt, aber gegen das Ende gerade; rücklaufender Nerv mündet in der Mitte der Areola. Beine ziemlich schlank, die hintersten deutlich lang. Petiolus glatt und glänzend, das 2te und 3te Segment punktiert.

Schwarz mit zahlreichen gelblichweissen Flecken. Antennen ohne weissen Ring. Gesicht, innere Augenränder, Clypeus, Mandibeln, Wangen, Halsrand, Schulter, Tegulen, beide Schildchen, je 3 grosse Flecke der Mesopleuren, Propodeum hinten, Vorder- und Mittelhüften, Vordertrochantern, Hintertarsen in der Mitte und jedes Hinterleibssegment am Hinterrand gelblichweiss; Beine gelbrot, die Mitteltrochantern und -tarsen, die Hinterhüften, Trochantern, Schenkel an der Spitze, die Schienen, mit Ausnahme der Mitte, und die Tarsen schwärzlichbraun, die Mitteltrochantern und die Hinterhüften zum Teil weiss. Körperlänge: 6 mm.

Fundorte: Amping (1 ♂, V, 1910); Taihorin (1 ♂, IV, 1910).

Unterscheidet sich von den 2 vorigen Arten durch die kleine Gestalt und die Färbung der Beine.

Ceratocryptus bituberculatus CAM.

Ceratocryptus bituberculatus CAMERON, Mem. Phil. Soc. Manchster, XLVII, p. 6, ♀ (1903).
Ceratocryptus tuberculatus SCHMIEDEKNECHT, Gen. Ins., p. 67 (1908).
Mesostenus shinshanus MATSUMURA, Thous. Ins. Jap., Suppl. IV, p. 125, Pl. XLIX, fig. 1, ♀ (1912).

Polyaenus striatus SZÉPLIGETI, Ann. Mus. Nat. Hung., XIV, p. 264, ♀ (1916).

Lactolus shinshanus UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 190, ♀ (1931).

Fundort: Kankau (1 ♂, IX, 1912), Diese Art ist nicht häufig in Formosa.

Friona okinawana UCH.

Friona okinawana UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 319, ♀ ♂ (1930); id., l. c., XXX, p. 190, ♀ (1931).

Cryptus flavicoxatus SONAN, Trans. Nat. Hist. Soc. Formosa, XX, p. 272, ♂ (1930).

Fundorte: Hôzan (1 ♂, am 7. IX, 1910); Kankau (1 ♀, 1 ♂, VIII, 1908; 6 ♀, 3 ♂, VII, VIII, IX, 1912); Kôsempo (2 ♀, 2 ♂, IV, 1908); Taihorin (2 ♀, 6 ♂, VI, VII, XI, 1911).

Diese Art ist sehr häufig in Formosa und Schmarotzer von *Hyblaea puera* CRAM. (nach SONAN).

Takastenus longidentatus UCH.

Takastenus longidentatus UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 189, Taf. II, fig. 20, ♀ (1931).

Fundorte: Kankau (7 ♂, IV; VIII, XI; 1 ♀, IX, 1912; 1 ♂, VII, 1912); Teraso (2 ♂, II; 1 ♀, IV, 1909).

Orintostenaraeus chinensis UCH.

Orientostenaraeus chinensis UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 321, Taf. IV, fig. 14, ♀ (1930).

Fundorte: Polisha (1 ♀, 1 ♂, IV, 1910); Kankau (1 ♀, X, 1911).

Listrognatus sauteri sp. nov.

♂. Dicht grob punktiert und dicht weisslich pubescent. Kopf nach hinten etwas verengt; Stirn gerunzelt; Gesicht fein punktiert; Mandibeln dick, kurz, mit 2 kleinen Zähnen. Antennen fadenförmig, von Körperlänge; Schaft oval, unten rundlich verdickt. Parapsidenfurchen nur vorn schwach angedeutet; Schildchen nicht gerandet; Propodeum mit 2 Querleisten, hinten schräg; Luftlöcher klein, rundlich oval. Hinterleib gegen das Ende zu glatt, zwischen dem 2ten und 3ten Segment tief eingeschnürt. Flügel gelblich hyalin; Areola klein und quadratisch.

Schwarz. Gesicht, Clypeus, Mandibeln, Wangen, Stirnränder, Schaft unten, Palpen, Tegulen, Schultern, je ein Fleck unter den Tegulen, je ein grosser Fleck unter den Hinterflügeln, Schildchen an der Spitzenhälfte, Vorder- und Mittelhüften grösstenteils, Hintertarsen in der Mitte und die Basis der Hinterschienen und der Metatarsen weisslich; jedes Hinterleibs-

segment am Endrand weisslich gesäumt, aber die 3 Basalsegmente je am Hinterrand bräunlich. Beine gelbrot, die hintersten mit Ausnahme der *Basalhälfte der Schenkel schwärzlich.* *Körperlänge: 8 mm.*

Fundort: Taihorin (2 ♂, IV, 1910; 2 ♂, am 7. XII, 1911).

Die Art unterscheidet sich von *L. coreensis* Uch. durch die Färbung der Beine.

Exolytus laevigatus Grav. f. *kiushuensis* Uch.

Exolytus laevigatus Gravenhorst, f. *kiushuensis* Uchida, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 323, ♀ ♂ (1930).

Fundorte: Taihorin (6 ♂, IV, V, 1910); Amping (1 ♂, V, 1910).

Hemiteles (*Prosopostenus*) *koshunensis* sp. nov.

♂. Kopf glatt, stark glänzend, nach hinten verengt; Leiste des Hinterkopfes nicht gebrochen; Ocellen klein; Stirn und Fühlergruben eingedrückt; Gesicht nach unten deutlich verschmälert; Clypeus klein, vorn zugerundet. Antennen schlank, fast von Körperlänge. Mesonotum glatt, mit tiefen Parapsiden; Schildchen seitlich bis zur Mitte gerandet; Mesopleuren zerstreut punktiert; Propodeum lang, mit 2 Querleisten; Area superomedia und Area basalis undeutlich. Hinterleib gegen das Ende zu schwach zusammengedrückt. Beine schlank und lang, die Hintertrochantern so lang wie der Metatarsus. Flügel hyalin; Stigma schmal; Areola aussen offen; Nervulus interstitial; Nervellus unter der Mitte gebrochen.

Schwarz und glänzend. Fühler an der Basis und der Schaft gelbbraun. Mesothorax unten und Propodeum rötlichbraun. Beine gelbrot, die vordersten mehr gelb. Hinterleib gelbbraun mit schwarzem Ende. Körperlänge: 6 mm.

Fundort: Koshun (3 ♂, am 22. IV, 1912).

Prosopostenus subgen. nov.

Diese Untergattung unterscheidet sich von der typischen Gattung durch das nach unten deutlich konvergierende Gesicht, die schlanke Gestalt und die lang gestreckten Hintertrochantern.

Genotypus: *Hemiteles* (*Prosopostenus*) *koshunensis* Uch.

Hemiteles (*Koshunia*) *taiwanellus* sp. nov.

♀. Körper stark gedrungen. Fühler schlank, fast von der Körperlänge. Kopf grob punktiert, weisslich fein pubescent, nach hinten verengt. Mesonotum runzelig punktiert, mit deutlichen Parapsiden; Schildchen seit-

wärts nicht gerandet, glatt; Mesopleuren fein quergerunzelt; Propodeum von der Seite gesehen an der Spitze fast senkrecht, deutlich gefeldert, Area superomedia hexagonal. Hinterleib länglich oval, das erste Segment stark gekrümmt, der Postpetiolus deutlich erweitert, längsgestreift, das 2te und 3te auffallend stark runzelig punktiert, am Endrand aber glatt, das 4te nur an der Basis zerstreut punktiert, die übrigen glatt und glänzend. Bohrer so lang wie der Petiolus. Beine dick. Flügel hyalin, mit einem breiten dunkelbraunen Band und dunklem kleinen Fleck. Körperlänge: 5 mm.

Gelbbraun. Hinterleib am Ende dunkelbraun. Beine weisslichgelb, die Hinterschienen dunkelbraun, in der Mitte aber weiss geringelt.

Fundort: Koshun (1 ♀, IV, 1912).

Koshunia subgen. nov.

Diese Untergattung unterscheidet sich von den anderen Untergattungen durch den gedrungenen Körper, die Zeichnung des Hinterleibs und die Form des Propodeums.

Genotypus: *Hemiteles* (*Koshunia*) *taiwanellus* UCH.

Orientohemiteles ovatus sp. nov.

♀. Robuste Art. Körper grob runzelig punktiert und dicht, ziemlich lang weisslich behaart. Kopf kurz; Stirn und Schläfen grob runzelig punktiert; Gesicht dicht fein gerunzelt; Clypeus nicht vom Gesicht getrennt; Mandibeln mit kleinen Zähnen. Thorax gedrungen, grob runzelig punktiert; Schildchen schwach konvex, seine Basalgrube mit 4 kurzen Längs-

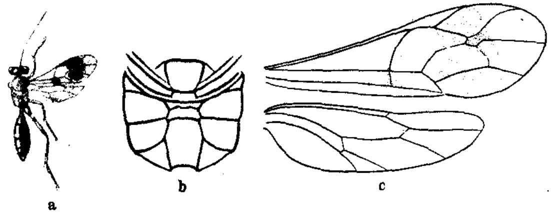


Fig. 15

a. *Orientohemiteles ovatus* UCH. (♀)
b. Propodeum von *O. ovatus* UCH. von oben gesehen
c. Vorder- und Hinterflügel von *O. ovatus* UCH.

kielen; Propodeum sehr kurz, hinten steil abfallend, ganz gefeldert, Area superomedia fast 4 mal so breit wie lang, Luftlöcher gross, rund. Hinterleib oval, dicht grob längsgerunzelt. Flügel hyalin, mit 2 dunkelbraunen Flecken; Areola aussen offen. Beine dick. Bohrer so lang wie das erste Segment.

Rot und matt. Kopf und Hinterleib ganz schwarz, der letztere am Ende rotbraun. Antennen und Hinterleib dunkel rotbraun, die Hinter--hüften, -schienen und -tarsen schwärzlich, aber die Schienen an der Basis weisslich geringelt. Körperlänge: 6,5 mm.

Fundort: Kosempo (1 ♀, IV, 1912).

Orientohemiteles gen. nov.

Körper grob runzelig punktiert und dicht behaart, besonders der Hinterleib dicht grob längsgerunzelt. Kopf quer, sehr kurz, hinten nicht über die Augen verlängert, von oben gesehen fast scheibenartig versehen. Fühler kurz, kaum länger als Kopf und Thorax zusammen, hinter der Mitte ein wenig verdickt. Gesicht in der Mitte schwach gewölbt. Thorax kurz und gedrungen, fast kubisch; Schildchen rundlich konvex, seitwärts nicht gerandet; Propodeum ganz gefeldert, von der Seite gesehen an der Spitze senkrecht, die Luftlöcher rund; Area superomedia deutlich quer. Hinterleib oval, das erste Segment stielartig verlängert, schmal, der Postpetiolus breit. Beine dick. Nervellus weit unterhalb der Mitte gebrochen; Nervulus interstitial; Nervus parallelus unter der Mitte der Brachialzelle vorspringend.

Genotypus: *Orientohemiteles ovatus* UCH.

Die neue Gattung steht zwischen *Hemiteles* und *Brachycryptus*, unterscheidet sich aber vom ersteren durch die Form des Kopfes und Thorax sowie auch vom letzteren durch die Form des Postpetiolus und die Felderung des Propodeums.

Odontocryptus brillantus sp. nov.

♀. Kopf hinter den Augen verengt, glatt; Scheitel schmal; Stirn und Fühlergruben glatt; Gesicht fein punktiert; Clypeus gewölbt, vorn abgestutzt; Mandibeln mit 2 gleichen Zähnen. Fühler ziemlich dick, fadenförmig, deutlich kürzer als der Körper; Schaft gross, rundlich oval, hinten ausgeschnitten. Thorax breiter als der Körper, glatt, glänzend; Mesonotum hinten in der Mitte mit 2 kurzen tiefen Furchen; Schildchen nicht gerandet, die Basalkiele kräftig; seine Basalgrube breit und tief, mit 3 Längsleisten; Pro- und Mesopleuren zum Teil glatt; Propodeum auffallend

grob und stark netzartig gerunzelt, die Seiten in jeder Mitte zerstreut grob punktiert, hinten beiderseits je mit 2 dicken Zähne, Area superomedia und basalis ganz verschmolzen, die Luftlöcher gross und lang gestreckt. Beine dick, die Schienen am Ende mit kurzen Dornen. Flügel dunkelbraun getrübt, die Hinterflügel nur an der Basis heller; die Radialzelle lang, der Endabschnitt stark gebogen; Areola gross, pentagonal, der untere Aussenwinkel der Diskoidalzelle ein rechter; Nervellus weit unter der Mitte gebrochen, leicht antefurkal; Nervulus interstitial; Nervus parallelus unter der Mitte der Brachialzelle vermündet. Hinterleib länglich oval, ganz glatt. Bohrer so lang wie der Hinterleib mit Ausnahme des ersten Segments. Körperlänge: 16 mm.

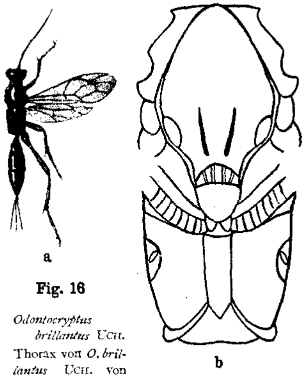


Fig. 16

a. Odontocryptus brillantus UCH.
b. Thorax von *O. brillantus* UCH. von oben gesehen

Glänzend violettblau. Fühler, Schienen und Tarsen schwärzlich; Mandibeln zum Teil schwarzbraun; Gesicht metallisch grün.

Fundort: Suishario (1 ♀, X, 1911).

Der Färbung nach *Cryptaulax coreanus* SZÉPL. sehr ähnlich, weicht aber von ihm durch die Bildung des Mesothorax und Propodeums ab.

Odontocryptus gen. nov.

Kopf nach hinten verengt; Stirn und Fühlergruben tief eingedrückt; Wangen ziemlich lang. Thorax breiter als der Kopf; Mesonotum vorn abgestutzt, beiderseits je mit 2 grossen Höckern; Mesopleuren zum Teil grob gerunzelt; Propodeum grob netzartig gerunzelt, hinten beiderseits je mit 2 grossen Zähnen; Luftlöcher lang gestreckt. Das erste Hinterleibssegment zwischen Petiolus und Postpetiolus deutlich gekrümmt und stark aufgetrieben, die Luftlöcher etwas hinter der Mitte liegend, der Postpetiolus unten beiderseits je mit einem Zähnchen; das 2te und 3te Segment deutlich grösser als die anderen und länger als breit. Bohrer lang vorragend. Beine dick; Schienen am Ende mit kurzen Dornen. Flügel normal; Areola

pentagonal; Nervellus weit unter der Mitte gebrochen; Endabschnitt des Radius deutlich gekrümmt.

Genotypus: *Odontocryptus brillantus* UCH.

Diese Gattung ist verwandt mit *Plectocryptus* THOMS., unterscheidet sich aber von ihm durch die Zähne des Mesonotums, Propodeums und Postpetiolus sowie auch die Form des ersten Hinterleibssegments.

Acanthocryptus hokutensis sp. nov.

♀. Kopf nach hinten verengt, schmaler als der Thorax, dicht grob punktiert und bräunlich fein pubescent. Fühler dick, kurz, einige Basalgeisselglieder länger als breit; Schaft gross, rundlich oval. Thorax robust, dicht punktiert, matt; Parapsiden nur vorn angedeutet; Schildchen an der Basis gerandet; Propodeum kurz, hinten steil abfallend, die Seitenzähne gross und kräftig, Area superomedia fast pentagonal, Area basalis nach hinten konvergierend, aber nicht quer. Hinterleib glatt, glänzend, oval, das erste Segment mit 2 Längskielen. Bohrer fast vom ersten Segment. Flügel bräunlich getrübt; Stigma dunkelbraun, an der Basis gelblich; Areola nach oben verengt.

Grundfarbe rot und matt. Kopf schwarz, die inneren Augenränder schmutzig rot. Fühler dreifarbig (an der Basis rot, in der Mitte weiss und an der Spitze schwarz). Mesothorax an den Seiten des Schildchens mit schwarzem Fleck; Mesosternum in der Mitte zum Teil schwarz. Hinterschenkel und -schienen an der Spitze und ihre Tarsen schwärzlich. Hinterleib stark glänzend, die 2 Basalsegmente rot, mit schwarzen Flecken, die folgenden 3 Segmente fast schwarz. Körperlänge: 6,5 mm.

Fundort: Hokutō (1 ♀, III, 1912)

Diese Art unterscheidet sich von *A. hopei* MORL. durch den ganz rotgefärbten Thorax.

Formocryptus tenuicornis UCH.

Formocryptus tenuicornis UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXX, p. 192, Taf. II, fig. 17, ♀ (1931).

Fundort: Taihorin (1 ♀, am 7. XI, 1911).

Leptocryptus pilosus sp. nov.

♂. Kopf und Thorax dicht weisslich behaart, der erstere nach hinten breit, leicht rundlich verschmälert, glatt; Clypeus in der Mitte mit 2 kleinen Zähnen. Thorax schmaler als der Kopf, lang gestreckt, nach hinten deutlich verschmälert; Schildchen flach, nicht gerandet, Propodeum ganz ge-

feldert; Area superomedia viel länger als breit, Costula vor der Mitte, die Luftlöcher klein und rund. Hinterleib linear, deutlich länger als Kopf und Thorax zusammen. Flügel hyalin; Stigma bräunlich; Radialzelle kurz. Antennen kürzer als der Körper, fein pubescent.

Schwarz. Schaft unten, Mandibeln, mit Ausnahme der Spitze, und Palpen weisslich. Beine gelblich, die hintersten dunkel rötlichbraun bis schwärzlichbraun. Jedes Hinterleibssegment am Hinterrand bräunlich, die Bauchseite des Hinterleibs gelblich. Körperlänge: 11–12 mm.

Fundort: Taihorin (2 ♂, V, 1910).

Leptocryptus suishariensis sp. nov.

♀. Kopf nach hinten rundlich verschmälert, fast glatt, schwach glänzend. Fühler schlank, fadenförmig. Thorax glatt, glänzend, aber das Mesonotum lederartig fein punktiert und matt; Parapsiden tief; Schildchen bis zur Mitte gerandet; Propodeum ganz gefeldert, Area superomedia pentagonal. Hinterleib länglich oval; Postpetiolus fein längsrissig und das 2te Segment an der Basis sehr fein quergerunzelt. Bohrer vom ersten Hinterleibssegment. Flügel hyalin; Stigma fast dreieckig; Radialzelle kurz und breit.

Gelbbraun. Kopf ganz schwarz. Fühler dunkelbraun. Thorax zum Teil schwarz. Das erste Segment ganz und die übrigen je am Hinterrand schwärzlich. Bohrer hell gelbbraun. Körperlänge: 6 mm.

Fundort: Suishario (1 ♀, X, 1911).

Giraudia ranrunensis sp. nov.

♀, ♂. Kopf quer, hinter den Augen verengt; Stirn und Gesicht punk-

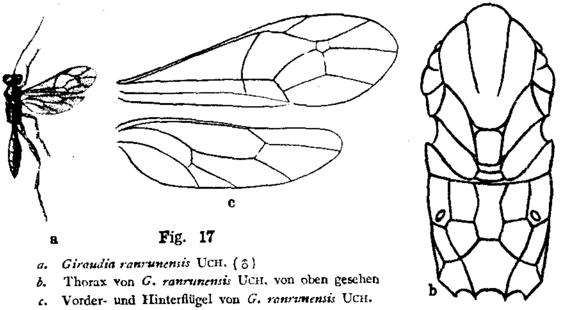


Fig. 17

a. *Giraudia ranrunensis* UCH. (♂)
b. Thorax von *G. ranrunensis* UCH. von oben gesehen
c. Vorder- und Hinterflügel von *G. ranrunensis* UCH.

tiert; Clypeus flach, vorn abgestutzt; Mandibeln schlank. Fühler kürzer als der Körper, hinter der Mitte erweitert, an der Spitze zugespitzt. Thorax zerstreut fein punktiert; Parapsiden undeutlich; Schildchen nur an der Basis gerandet; Propodeum deutlich gefeldert, die Seitenzähne gross. Hinterleib lang gestreckt, das erste Segment mit Rückenkielen, glatt, das 2te fein punktiert. Bohrer kürzer als das erste Segment. Beine schlank. Flügel hyalin; Stigma schmal, blassgelb; Areola gross, pentagonal, die Seiten fast parallel.

Schwarz. Fühler schwarzbraun mit weissem Ring in der Mitte. Beine und die 2 Basalhinterleibssegmente rot, die Vorder- und Mittelhüften, ihre Trochantern, die Hintertarsen in der Mitte und die Basis des ersten Segments gelblich; Hinterleibsende weiss. Schildchen, mit Ausnahme der Basis, und Hinterschildchen rein gelb. Beim Männchen die Hinterschienen schwarzbraun. Körperlänge: ♀ ♂ 7–9 mm.

Fundorte: Ranrun (1, ♀ am 7. VIII, 1925, UCHIDA); Kusukusu (1 ♂, am 23. III, 1926, ISSIKI); Taihorin (1 ♀, 2 ♂, XII, XI, 1911); Suishario (1 ♀, X, 1911).

Der Holotypus in der Sammlung des entomologischen Museums der kaiserlichen Hokkaido Universität in Sapporo.

Microcryptus magnispiracularis sp. nov.

♀. Kopf quer, lederartig fein punktiert, hinter den Augen verschmälert. Fühler fadenförmig, fast von Körperlänge. Mesonotum fein punktiert, mit tiefen Parapsiden; Pleuren und Propodeum fein runzelig; Area superomedia lang, Costula in der Mitte, die Seitenzähne klein. Hinterleib länglich, fein punktiert. Bohrer kürzer als der Petiolus. Flügel hyalin; Areola fünfseitig, nach oben etwas konvergierend.

Schwarz. Fühler in der Mitte, Gesicht zum Teil, Clypeus, Mandibeln an der Basis, Palpen, beide Schildchen, Hals oben, Tegulen und Hinterleibsende weiss. Beine rot, die Hinterschienen an der Spitze und ihre Metatarsen grösstenteils schwärzlich, die anderen Glieder der Hintertarsen weisslich. Petiolus dunkel rotbraun, das 2te und 3te Segment am Ende gelbbraun.

♂. *Fühler ziemlich dick, hinter der Mitte weiss geringelt.* Schaft unten, Gesicht, Vorder- und Mittelhüften und ihre Trochantern weiss. Stimmt sonst mit dem Weibchen völlig überein. Körperlänge: 7–11 mm.

Fundorte: Suishario (1 ♀, II, 1911); Amping (1 ♀, V, 1910); Taihorin (6 ♂, I, IV, V, 1910; 2 ♂, am 7. XII, 1911).

Unterfamilie PIMPLINAE

Torbda sauteri sp. nov.

♀. Grosse und robuste Art. Fühler fadenförmig, etwas kürzer als der Körper; Schaft oval, hinten tief ausgeschnitten; Basalgeisselglieder viel länger als breit. Kopf gross, glatt, hinter den Augen schmal, rundlich verschmälert; Stirn gerunzelt; Gesicht und Clypeus zerstreut punktiert; Mandibeln mässig dick, mit 2 dicken Zähnen, von denen der untere nur wenig länger als der obere ist; Schläfen ziemlich aufgetrieben. Thorax

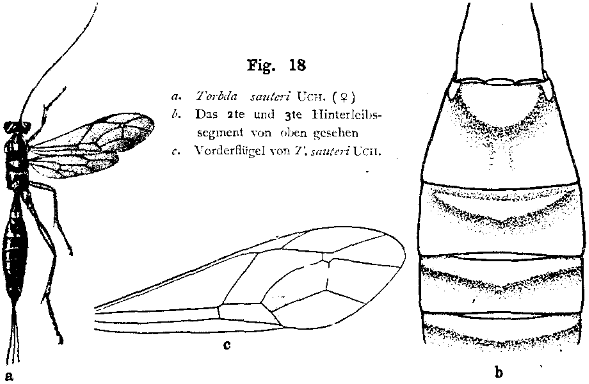


Fig. 18

a. Torbda sauteri UCH. (♀)
b. Das 2te und 3te Hinterleibssegment von oben gesehen
c. Vorderflügel von *T. sauteri* UCH.

zerstreut punktiert, fein behaart; Propodeum hinten grob runzelig punktiert; Scutellum flach, sein Basalkiel kräftig. Flügel gelblich hyalin, am Randmal bräunlich getrübt, mit grossem braunen Fleck am ersten rücklaufenden Nerv; Areola pentagonal, mit parallelen Seiten; Endabschnitt des Radius doppelt gekrümmt; Nervulus weit vor der Gabel; Nervellus in oder etwas über der Mitte gebrochen, stark postfurcal. Beine lang, die Vorderschienen stark verdickt, an der Basis aber deutlich geschnürt. Hinterleib spindelförmig und länger als Kopf und Thorax zusammen, das erste Segment glatt, glänzend, mit einigen Punkten, der Postpetiolus in der Mitte schwach eingedrückt, vom 2ten Segment an dicht punktiert, das 2te Segment mit Y-förmigem Eindruck und die übrigen in jeder Mitte mehr oder weniger

quereingedrückt. Bohrer fast von halber Hinterleibslänge. Körperlänge: 19–23 mm.

Schwarz mit zahlreichen weisslichgelben Flecken. Mandibeln braun, an der Endhälfte schwärzlich. Antennen in der Mitte, Gesicht, Clypeus, Augenränder, Schläfen, Halsrand, Schildchen, Flecken des Thorax und alle Hüften weisslichgelb; Beine fast gelbrot, die hintersten Hüften schwarz gefleckt; jedes Hinterleibssegment am Hinterrand gelblich gesäumt. Stigma im Vorderflügel schmal, dunkelbraun; Nerven schwärzlich.

♂. Körper schlank; Hinterleib lang und linear. Fühler länger als der Körper, ohne weissen Ring. Hinterleib gegen das Ende zu bräunlich. Sonst mit dem Weibchen übereinstimmend. Körperlänge: 12–16 mm.

Fundort: Kankau (3 ♀ und 2 ♂, IV, VII, VIII, 1912).

Nahe verwandt mit *T. violaceipennis* CAM., unterscheidet sich aber von ihr durch die Färbung des Flügels und der Beine.

Torbda* (*Neotorbda*) *taihokensis sp. nov.

♀. Kopf glatt, hinter den Augen verschmälert; Scheitel ziemlich aufgetrieben; Gesicht spärlich fein punktiert; Labrum deutlich vorragend. Antennen schlank, fadenförmig, fast von Körperlänge. Mesonotum kaum punktiert, ganz matt; Parapsiden deutlich tief; Schildchen schwach rundlich gewölbt, nicht gerandet; Pleuren runzelig, die Mesopleuren in jeder Mitte glatt; Propodeum fein punktiert, mit 2 Querleisten, Luftlöcher ziemlich klein und rund. Flügel hyalin; Areola pentagonal; Radialendabschnitt doppelt gekrümmt, etwas länger als der Basalabschnitt; Nervellus fast in der Mitte gebrochen. Beine lang und schlank. Hinterleib spindelförmig, dicht fein punktiert; Bohrer fast von halber Hinterleibslänge. Körperlänge: 11–12 mm.

Schwarz mit weissen Flecken. Weiss sind: Fühler in der Mitte, Gesicht, Augenränder, Schläfen, Vorderhüften, Schildchen, Halsrand, je ein Fleck vor und unter den Flügeln, ein Makel des Mesonotums, einige grosse Flecke des Mesothorax und Propodeums. Beine gelbrot, die hintersten Schienen am Ende schwärzlich, ihre Tarsen weiss, aber das Endglied schwarz. Jedes Hinterleibssegment am Endrand weiss, das Endsegment auf der Rückenseite ganz weisslich. Stigma und Nerven schwärzlich.

Fundorte: Taihoku (1 ♀, am 6. III, 1925, S. ISSIKI); Shinsuie (1 ♀, am 17. III, 1926, S. ISSIKI); Shinka (1 ♀, am 9. VII, 1915, M. ISHIDA); Funkiko (1 ♀, am 16. V, 1926, S. ISSIKI); Hôzan (2 ♀, II, 1910, H. SAUTER). Der Holotypus in der Sammlung des Museums der kaiserlichen

Hokkaido Universität in Sapporo.

Diese Art unterscheidet sich von der vorigen Art durch die Zeichnung des Thorax und der Beine sowie auch den nicht getrübten Flügel.

f. ***kosemponis*** nov.

Unterscheidet sich von der typischen Art durch das fast ganz gelbrot gefärbte Propodeum und das erste Hinterleibssegment.

Fundorte: Kôsempo (1 ♀, IV, 1912); Maruyama (1 ♀, IV, 1914); Taihorin (1 ♀, am 7. VII, 1911).

Torbda **(*Neotorbda*)** ***unicolor*** sp. nov.

♀, ♂. Ganz gelbrote Art. Fühler gegen das Ende zu dunkelbraun; beim Weibchen in der Mitte breit weiss geringelt. Gesicht, Stirn und Schläfen gelblich; Scheitel schwärzlich. Hintertarsen weisslichgelb.

Kopf glatt, glänzend, hinter den Augen verschmälert; Gesicht kaum punktiert; Clypeus vorn breit eingedrückt. Thorax fast glatt, stark glänzend; Propodeum zerstreut fein punktiert; Schildchen rundlich; an der Basis seitlich gerandet. Flügel gelblich hyalin; Stigma und Nerven braun; Areola pentagonal, etwas breiter als hoch, nach oben nur wenig konvergierend; Radialendabschnitt leicht gekrümmt; Nervulus vor der Gabel; Nervellus in der Mitte gebrochen. Das erste Hinterleibssegment zerstreut und die übrigen dicht punktiert, vom 2ten Segment an mehr oder weniger in der Mitte quereingedrückt, der Quereindruck des 2ten Segments sehr stark und nach hinten gebogen. Bohrer so lang wie die Hinterleibslänge mit Ausnahme des Petiolus. Körperlänge: ♀ ♂ 8–10 mm.

Fundorte: Kankau (1 ♂, am 22. IV, 1912; 3 ♀, VII, 1912); Honshu (Wakayama) (1 ♀).

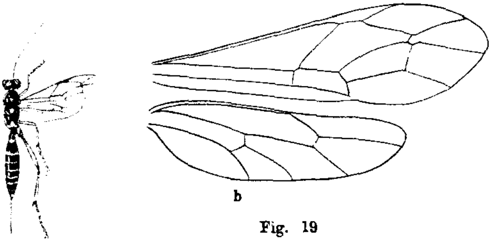
Unterscheidet sich von *T. apicalis* CAM. durch den ganz gelbrot gefärbten Hinterleib. Der Holotypus in der Sammlung des entomologischen Museum der kaiserlichen Hokkaido Universität in Sapporo.

Pseudotorbda geniculata sp. nov.

♀. Kopf hinter den Augen schmal, nur wenig verengt; Scheitel aufgetrieben; Gesicht schwach gewölbt, fein runzelig punktiert. Fühler fadenförmig, fast von Körperlänge. Mesonotum grob punktiert; Scutellum flach, nicht gerandet; Pleuren runzelig punktiert; Propodeum deutlich quergerunzelt. Flügel hyalin; Areola pentagonal, aussen offen; Stigma schmal, schwarz; Radialzelle kurz. Das erste Hinterleibssegment dick, kurz, rauh, die 3 folgenden dicht punktiert. Bohrer fast von halber Hinterleibslänge.

Körperlänge: 10–15 mm.

Schwarz und matt. Fühler hinter der Mitte breit weiss geringelt. Gesicht, Augenränder, Schläfen, Clypeus mit Ausnahme des Vorderrands, Hals, Schildchen, Schulter, ein Fleck auf dem Mesonotum, Tegulen, Mesosternum, je ein grosser Fleck auf den Mesopleuren, Propodeum hinten beiderseits, Vorder- und Mitteltrochantern und die hintersten Tarsen weiss.



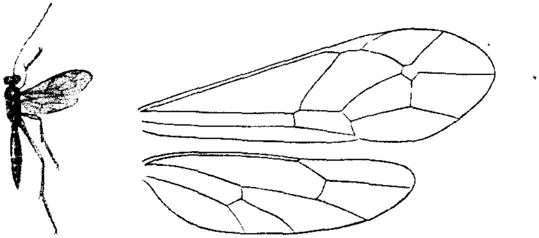
a b

Fig. 19

a. *Pseudotorbda geniculata* UCH. (♀)
b. Vorder- und Hinterflügel des Weibchens von *P. geniculata* UCH. (♀)

Mandibeln schwarz, zum Teil rotbraun. Beine gelbrot, die Hinterschienen am Ende und das letzte Tarsenglied schwärzlich, die Hinterhüften schwarz gefleckt.

♂. Körper und Fühler schlank, letzterer schwärzlich, ohne weissen Ring. Gesicht und Clypeus schwarz. Radialzelle sehr kurz, fast dreieckig.



c d

c. *P. geniculata* UCH. (♂)
d. Vorder- und Hinterflügel des Männchens von *P. geniculata* UCH. (♂)

Sonst mit dem Weibchen übereinstimmend. Körperlänge: 10–14 mm.

Fundorte: Tainan (1 ♂, am 10. VI, 1925, S. TAKANO); Taihorin (2 ♂, IV, 1910); Amping (1 ♂, V, 1910); Kankau (5 ♀, 2 ♂, VIII, 1912). Der Holotypus in der Sammlung des Museums der kaiserlichen Hokkaido Universität in Sapporo.

Der Form und Färbung nach *Torbda* (*Neotorbda*) *taihokensis* UCH. ähnlich, die generischen Charaktere sind jedoch ganz anders.

Pseudotorbda gen. nov.

Kopf hinter den Augen etwas rundlich verschmälert; Scheitel aufgetrieben; Clypeus vom Gesicht undeutlich geschieden, vorn eingedrückt, ohne Zahn; Labrum deutlich vorragend; Mandibeln kurz, dick, mit kleinen gleichen Zähnen; Mundöffnung deutlich. Fühler fadenförmig, fast von Körperlänge; Schaft oval, hinten tief ausgeschnitten; Fühlergruben tief eingedrückt. Mesonotum dreilappig, der mittlere Teil weit stärker und höher gewölbt als die Seitenlappen; Propodeum mit nur einer Querleiste, Luftlöcher länglich oval. Vorderschienen des Weibchens deutlich aufgetrieben, an der Basis stark eingeschnürt, ihre Schenkel gekrümmt und schwach flachgedrückt. Areola im Vorderflügel pentagonal, aussen ganz offen; Radialzelle beim Männchen sehr kurz, der Endabschnitt kräftig; Nervulus vor der Gabel; Nervellus in der Mitte gebrochen, postfurkal. Hinterleib spindelförmig, fein behaart; das erste Segment dick, kurz, in der Mitte gebogen, die Luftlöcher in der Mitte liegend. Bohrer kürzer als der Hinterleib.

Genotypus: *Pseudotorbda geniculata* UCH.

Diese Gattung ist verwandt mit der Gattung *Torbda* CAM., unterscheidet sich aber von ihr durch die folgenden Merkmale: 1) Radialzelle kurz; beim Männchen fast dreieckig, der Endabschnitt des Radius dick. 2) Das 7te Hinterleibssegment nicht besonders gross. 3) Luftlöcher des Propodeums klein und länglich oval.

Charitopimpla sagrae VOLL.

Pimpla sagrae VOLLENHOVEN, Stett. Ent. Zeit., 49, p. 149, ♀ ♂ (1879); SCHMIEDEKNECHT, Gen. Ins., p. 37 (1906).

Exeristes albicincta MORLEY, Faun. Brit. Ind., Hym. III, Ichn. I, p. 195, ♀ ♂ (1913); SONAN, Taiwan Noji-Hō, p. 621, ♀ ♂ (1921); UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 52, ♀ ♂ (1928).

Fundort (1 ♀, am 2. IX, 1910). Das Tier ist sehr häufig in Formosa und fast über den ganzen Orient verbreitet (Indien, Java, China und Japan). Als Wirte wurden festgestellt: *Clania variegata* CRAM., *C. destructor*

DUDG. und *C. minuscula* BUTL.

Bemerkung: In „Faun. Brit. Ind., Hym. III, Ichn. I, p. 194-196, 1913" hat C. MORLEY *Philopsyche* CAM.[1] als eine selbstständige Gattung und weiter *Charitopimpla* CAM.[2] als ein Synonym von *Exeristes* FÖRST. behandelt, aber die erstere scheint mir ein Synonym von *Charitopimpla* zu sein und im Gegenteil die letztere eine unabhängige Gattung.

Unterfamilie OPHIONINAE

Cremastus (Tarytia) shirakii SONAN

Apanteles simplicis SHIRAKI (nec VIERECK), Ext. Rep. Agr. Exp. Stat. Formosa, XV, p. 137 (1917).

Cremastus (Tarytia) shirakii SONAN, Trans. Nat. Hist. Soc. Formosa., XX, p. 142, ♀ (1930).

Fundort: Amping (1 ♀, am 7. V, 1911).

Cremastus (Tarytia) coreanus UCH.

Diaparsis coreanus UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXI, p. 285, Taf. VI, fig. 16, ♀ (1928).

Fundort: Hôzan (4 ♀, am 7. IX).

f. ***kigaonis*** nov.

♀. Untercheidet sich von der Stammform durch die ganz gelbrot gefärbte Brust.

Fundort: Kankau (2 ♀, VII, 1912).

Cremastus (Tarytia) minimus sp. nov.

♀. Kopf dicht punktiert, hinter den Augen rundlich verschmälert. Fühler etwas länger als der halbe Körper. Mesonotum dicht fein runzelig punktiert; ohne Parapsidenfurchen; Schildchen nur an der Basis gerandet; Propodeum lang, Area superomedia viel länger als breit; Costula undeutlich und vor der Mitte der Area superomedia vorspringend. Das erste Hinterleibssegment glatt, glänzend, am Ende rundlich verdickt, das 2te mehr als 3 mal so lang wie breit, dicht fein punktiert, die folgenden deutlich zusammengedrückt. Bohrer fast so lang wie ⅔ des Hinterleibs. Flügel hyalin; Stigma dreieckig; Rücklaufendenerv leicht hinter dem Kubitalquernerv; unterer Aussenwinkel der Diskoidalzelle ein rechter; Nervellus nicht gebrochen. Körperlänge: 4,5 mm.

Rot und matt. Kopf gelb; Stirn, Gesicht und Occiput wie die Grundfarbe. Mandibeln gelb, an der Spitze rotbraun. Antennen gegen die

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1): *Philopsyche* CAMERON, Spolia Zeylanica, p. 138 (1905).

2): *Charitopimpla* CAMERON, Journ. Str. Br. R. As. Soc., p. 48 (1902).

Spitze zu gebräunt. Beine rötlichgelb, die Schienen an den Spitzen braun. Petiolus an der Basis und die übrigen Segmente je am Rücken rotbraun. Stigma hell gelbbraun.

Fundort: Kankau (1 ♀, V, *1912*).

Das Tierchen unterscheidet sich von den verwandten Arten (*C. coreanus* UCH. und *C. shirakii* SONAN) durch die Form der Area superomedia sowie auch die Färbung des Stemmaticums und des Hinterleibs.

Pristomerus punctatus sp. nov.

♀. Kleine und schwarze Art. Kopf breiter als der Thorax, hinter den Augen stark verengt; Stirn und Scheitel lederartig fein und Gesicht grob punktiert, das letztere in der Mitte leicht gewölbt; Clypeus rundlich konvex, vorn abgerundet; Mandibeln mit 2 gleichen Zähnen. Antennen deutlich kürzer als der Körper, einige Basalgeisselglieder viel länger als breit, das erste am längsten. Mesonotum dicht fein punktiert, matt; Parapsiden nur vorn schwach angedeutet; Schildchen zerstreut grob und stark punktiert, aber die Spitze und das Hinterschildchen dicht längsgerunzelt; *Pleuren in der Mitte runzelig; Mesopleuren und Propodeum ziemlich grob* punktiert; Area superomedia länger als breit, pentagonal, Costula deutlich vor der Mitte. Postpetiolus, das 2te Segment ganz und das 3te an der Basalhälfte dicht gestreift. Bohrer etwas kürzer als der Hinterleib. Hinterschienen nicht auffallend verdickt, unten mit grossem Zahn, die Kerbzähne undeutlich oder fast fehlend. Flügel hyalin; Stigma braun; Nervellus gebrochen, ohne Ast. Körperlänge: 4-7 mm.

Schwarz und matt. Fühler schwärzlichbraun, aber die Basis und der Schaft hell braun. Clypeus, Mandibeln, Prothorax, Beine und Hinterleib zum Teil rotbraun bis dunkel rotbraun, zuweilen Mesonotum und Schildchen braun oder braun gefleckt; Hinterschienen an der Spitze stets und die Hinterbeine höchstens fast ganz dunkelbraun. Das erste Hinterleibssegment an der Basis gelbbraun, der Postpetiolus, das 2te Segment und die Basis des 3ten Segments schwärzlich, die Rückenseite des Hinterleibs mehr oder weniger *schwärzlichbraun.*

Fundorte: Taihoku (2 ♀, IV, 1912); Taihorin (1 ♀, I, 1910; 1 ♀, IV, 1912).

Das Tier its verwandt mit *P. marginicollis* CAM., unterscheidet sich aber von ihm durch das punktierte Schildchen.

Pristomerus scutellaris sp. nov.

♀, ♂. Kopf so breit wie der Thorax, hinter den Augen stark ver-

schmälert, lederartig fein punktiert; Gesicht punktiert; Mandibeln dick, mit 2 gleichen Zähnen; Ocellen klein; beim Männchen der Scheitel schmal, die Ocellen ziemlich gross, an die Augen stossend. Fühler kürzer als der Körper. Mesonotum dicht punktiert, der Mittelteil deutlich vorgezogen; Propleuren in der Mitte gerunzelt; Mesopleuren und Propodeum punktiert; Speculum deutlich; Area superomedia hexagonal, deutlich lang, oben sehr schmal, Area petiolaris dicht quergerunzelt; Schildchen ganz glatt, stark glänzend, an der Basis gerandet. Hinterschenkel verdickt, unten mit langem Zahn, die Kerbzähne deutlich; beim Männchen die Vorder- und Mittelschenkel unten nahe der Spitze meist mit kleinen Zähnen. Flügel hyalin, aber am Randmal und unter dem Stigma bräunlich getrübt; Stigma schwärzlichbraun; Nervellus gebrochen, mit sehr kleinem Ast. Hinterleib länger als Kopf und Thorax zusammen, das erste Segment gegen das Ende allmählich verdickt; Postpetiolus, das 2te Segment und das 3te an der Basis dicht fein längsrissig gestreift, das 2te Segment so lang wie das erste. Bohrer kürzer als der Hinterleib. Körperlänge: 7–11 mm.

Fundorte: Kankau (14 ♀, 6 ♂, am 7. IV, 1912); Taihorin (2 ♀, am 7. XI, 1912).

Unterscheidet sich von *P. testaceus* MORL. durch das gestreifte 3te Hinterleibssegment.

Bemerkung: Die 4 Vorderschenkel des Männchens nahe den Spitzen unten je mit 2 Kerbzähnen, weshalb diese Art zur Gattung *Pristocelus* SZÉPL. (Gen. Insect., XXXIV, p. 48, 1905) gehört; da aber auch bei den Männchen der *Pristomerus*-Arten zuweilen die 4 Vorderschenkel unten je am Ende einen oder 2 kleine Zähne besitzen oder an dieser Stelle schwach gebuchtet sind, habe ich hier die SZÉPLIGET'ische Gattung *Pristocelus* als ein Synonym von *Pristomerus* CURT. behandelt.

Zacharops narangae CUSH.

Zacharops narangae CUSHMAN, Phil. Journ. Sc., XX, 5, p. 593, ♀ (1922); SONAN, Taiwan Noji-ho, 129, p. 149 (1925); UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXI, p. 274, ♀ ♂ (1926).

Fundort: Taihorin (1 ♀, am 7. VII, 1912). Diese Art ist Schmarotzer von *Naranga aenescens* MOOR., und vielleicht ein Synonym von *Z. dominarus* WK.

Zacharops striatus sp. nov.

♀, ♂. Kopf deutlich quer, kaum breiter als der Thorax, hinter den Augen verschmälert, dicht fein gerunzelt; Mandibeln kurz, mit 2 gleichen

Zähnen; Clypeus vorn breit abgerundet, schwach gerandet. Fühler deutlich kürzer als der Körper, gegen das Ende zu etwas verdünnt. Mesonotum dicht runzelig punktiert; Schildchen gross, breiter als lang, rundlich niedergedrückt, dicht fein weisslich behaart wie das Propodeum; Pro- und Mesopleuren deutlich grob längsgerunzelt; Propodeum unregelmässig gerunzelt, mit einigen undeutlichen Längsleisten. Beine schlank; Hintermetatarsus fast so lang wie die 3 folgenden Glieder zusammen, die Schienenendsporen fast ⅔ vom Metatarsus. Flügel glashell; Nerven und Stigma schwärzlichbraun; Nervellus ohne Ast, unter der Mitte leicht gekrümmt. Hinterleib fast 2 mal so lang wie Kopf und Thorax zusammen, vom 3ten Segment an deutlich zusammengedrückt, das erste Segment nach oben gebogen, der Postpetiolus deutlich verdickt, das 2te etwas kürzer als das erste. Bohrer kürzer als das 3te Hinterleibssegment.

Schwarz. Fühler gegen das Ende zu bräunlich. Schaft und Pedicellus unten, Vorder- und Mittelbeine, Palpen, Tegulen, die Hintertrochantern, ihre Schenkel an Basis und Spitze, die Schienen an der Basis und die 2 Hintertarsenglieder reingelb; die Hintertarsen am Ende bräunlich, die Mittelhüften und die Hinterschenkel schwarz; Hinterschienen schwärzlichbraun bis schwarz. Hinterleib rotbraun, aber an der Basis und am Rücken schwärzlichbraun, besonders das 2te Segment; das erste Segment in der Mitte gelbbraun. Körperlänge: 9 mm.

Fundorte: Honshu (Iwate, 1 ♀, T. OGASAWARA); Formosa (Kankau, 3 ♂, 1 ♀, VIII, 1912).

Das Tierchen schliesst sich an *Z. narangae* CUSH. an, weicht aber von ihm durch die grob längsgerunzelten Mesopleuren und die Färbung der Beine und des Hinterleibs ab. Der Holotypus in der Sammlung des entomologichen Museums der kaiserlichen Hokkaido Universität in Sapporo.

Charops taiwanus sp. nov.

♀. Kopf deutlich quer, hinter den Augen stark verengt, von oben gesehen scheibenförmig, dicht fein gerunzelt. Antennen fast von halber Körperlänge, gegen die Spitze zu verdünnt. Thorax gedrungen, etwas länger als breit, nach hinten deutlich verschmälert, dicht gerunzelt; Mesonotum vorn abgerundet, ohne Parapsidenfurchen; Schildchen flach, oben in der Mitte schwach niedergedrückt; Propodeum mit 2 Längskielen in der Mitte. Hinterleib mehr als 3 mal so lang wie Kopf und Thorax zusammen, das erste Segment am Ende rundlich verdickt, fast so lang wie das folgende. Bohrer sehr kurz, fast vom 5ten Hinterleibssegment. Beine schlank, die Hinterschienen und -tarsen mit feinen Dornen, ihre Schienenend-

sporen etwas kürzer als das Metatarsus. Flügel hyalin; Stigma und Nerven schwärzlich; *Nervellus in oder etwas über der Mitte gebrochen.*

Schwarz, ziemlich dicht weisslich behaart. Palpen, Mandibeln, Vorderbeine, Mittelschienen und -tarsen, ihre Schenkel an Basis und Spitze ebenso wie auch die Mittel- und Hintertrochantern an den Spitzen rein gelb; Vorderschenkel aussen zum Teil und die Hinterschienenendsporen bräunlich; Hüften unten höchstens gelb. Das erste Hinterleibssegment in der Mitte und die Seiten des Hinterleibs gegen das Ende zu mehr oder weniger rötlichbraun. Körperlänge: 12 mm.

Fundort: Kankau (4 ♀, am 22. IV, 1912).

Diese Art schliesst sich eng an *C. obtusus* MORL. aus Indien an, unterscheidet sich jedoch von ihm durch die Färbung der Beine und den kurzen Bohrer.

Dichelobosmina tuberculata sp. nov.

♀. Kopf deutlich quer, hinten der Augen geradlinig verschmälert; Stirn und Gesicht dicht gerunzelt und braun behaart; Clypeus vorn breit abgerundet; Mandibeln dick. Fühler ziemlich kräftig, gegen die Spitze zu verdünnt; Schaft cylindrisch, nicht ausgeschnitten. Thorax mässig kurz, etwas länger als hoch; Mesonotum matt, dicht gerunzelt; Schildchen rundlich erhaben, hinten abgerundet, dicht lang grau behaart, beiderseits nicht gerandet; Mesopleuren oben grob gerunzelt, unten punktiert; Propodeum kurz, dicht runzelig, grau behaart, in der Mitte breit längsgefurcht, Luftlöcher länglich elliptisch. Beine dick. Flügel hyalin, am Randmal etwas bräunlich; *Radialendabschnitt gekrümmt; Nervulus hinter der Gabel;* Nervellus nicht gebrochen. Hinterleib glatt. Bohrer kurz. Körperlänge: 11–12 mm.

Schwarz. Schaft und Pedicellus unten, Mandibeln (die Endzähne braun), Palpen und Tegulen gelblich; Beine und Hinterleib rötlichbraun; alle Hüften und das erste Segment, mit Ausnahme des Postpetiolus, schwarz, die Mittel- und Hintertrochantern an der Basis, die Hinterschenkel an der Basalhälfte, ihre Schienen an Basis und Spitze sowie auch die Tarsen ganz dunkelbraun, das 2te Segment an Basis und Ende mehr oder minder schwärzlich gefleckt. Stigma und Nerven dunkelbraun bis schwärzlich.

Fundort: Kankau (4 ♀, IV, VII, VIII, 1912).

Nahe verwandt mit *Charops narangae* CUSH., aber der Körper sehr gross und robust.

Dichelobosmina gen. nov.

Kopf deutlich quer, nach hinten sehr schmal, von oben gesehen scheibenartig gestaltet; Gesicht unterhalb der Fühler mit einem kleinen Höcker; innere Augenränder deutlich ausgerandet wie bei *Charops* HOLMGR.; Clypeus nicht vom Gesicht getrennt, vorn abgerundet und schwach gerandet; Mandibeln kräftig, mit 2 gleichen Zähnen. Fühler von Körperlänge, gegen das Ende zu etwas verdünnt; Schaft cylindrisch, hinten nicht ausgeschnitten. Thorax gedrungen, länger als hoch; Propodeum undeutlich gefeldert, Luftlöcher länglich elliptisch; Schildchen stark rundlich konvex, nicht gerandet. Hinterleib vom 3ten Segment an zusammengedrückt; das erste Segment nicht auffallend schlank, der Postpetiolus etwas verdickt, Luftlöcher hinter der Mitte liegend, das 2te Segment deutlich kürzer als das erste, etwas länger als breit; Gastrocölen rundlich, gross, nicht tief. Bohrer sehr kurz, fast versteckt. Flügel ohne Areola. Beine mässig dick; Klauen gekämmt; Schienen fein gedornt.

Genotypus: *Dichelobosmina tuberculata* UCH.

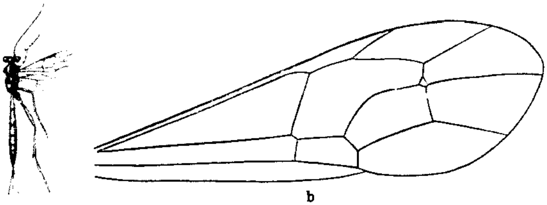
Diese Gattung steht zwischen *Charops* HOLMGR. und *Hymenobosmina* D. T., unterscheidet sich aber von den beiden Gattungen in folgender Weise:

Charops HOLMGR.	*Dichelobosmina* UCH.	*Hymenobosmina* D.T.
(1) Innere Augenränder deutlich ausgerandet.	(1) Innere Augenränder deutlich ausgerandet.	(1) Innere Augenränder nur wenig ausgerandet.
(2) Gesicht unterhalb der Fühler ohne Höcker.	(2) Gesicht unterhalb der Fühler mit kleinem Höcker.	(2) Gesicht unterhalb der Fühler ohne Höcker.
(3) Klauen gekämmt.	(3) Klauen deutlich gekämmt.	(3) Klauen nicht gekämmt, zuweilen mit dicken Borsten.
(4) Das erste Hinterleibssegment schlank, nach oben gebogen, der Postpetiolus deutlich verdickt.	(4) Das erste Hinterleibssegment ziemlich dick, der Postpetiolus nicht auffallend verdickt.	(4) Das erste Hinterleibssegment sehr schlank, am Ende nicht verdickt.
(5) Das 2te Segment kaum kürzer als das erste.	(5) Das 2te Segment kürzer als die Hälfte des ersten.	(5) Das 2te Segment kaum kürzer als das erste.
(6) Schildchen durch eine schmale, tiefe Querspalte vom Mesonotum getrennt.	(6) Schildchen durch eine Querfurche vom Mesonotum getrennt.	(6) Schildchen durch eine schmale, tiefe Querspalte vom Mesonotum getrennt.

Scenocharops longipetiolaris sp. nov.

♀, ♂. Kopf hinten deutlich schmal, dicht grob gerunzelt; Clypeus

vorn breit zugerundet; Mandibeln dick, mit fast gleichen, kleinen Zähnen. Antennen ziemlich dick, dicht pubescent. Thorax kurz, kaum länger als hoch, dicht fein weisslich pubescent, besonders das Propodeum; Mesonotum matt, dicht gerunzelt; Mesopleuren grob und stark runzelig punktiert; Propodeum grob gerunzelt, nicht gefeldert; Schildchen schwach rundlich konvex,



a b

Fig. 20

a. Scenocharops longipetiolaris UCH. (♀)
b. Vorderflügel von *S. longipetiolaris* UCH.

etwas breiter als lang, dicht lang gräulich behaart und fein gerunzelt, nur an der Basis seitlich gerandet. Hinterleib glatt, matt, fast 3 mal so lang wie Kopf und Thorax zusammen. Bohrer kurz vorragend. Flügel hyalin; Stigma schmal; Areola sehr klein.

Schwarz. Schaft unten dunkelbraun bis schwärzlich. Mandibeln, Palpen und Vorder- und Mittelbeine gelblich; Hinterbeine und Hinterleib rotbraun; alle Hüften schwarz, die Hinterschenkel an der Basis gebräunt, das 2te Segment am Rücken schwärzlich. Körperlänge: 14 mm.

Fundorte: (11 ♀, 1 ♂, am 7. IV, 1912); Hôzan (1 ♀, am 7. IX, 1910); Taihorin (1 ♀, am 7. VII, 1911).

Der Färbung nach der vorigen Art sehr ähnlich, weicht aber von ihr durch die lang gestielte Areola des Vorderflügels ab.

Scenocharops gen. nov.

Kopf hinten deutlich verschmälert, von oben gesehen scheibenartig versehen; innere Augenränder ziemlich tief ausgerandet; Clypeus nicht vom Gesicht getrennt. Fühler kaum länger als der halbe Körper, gegen das Ende zu etwas verdünnt. Thorax breiter als der Kopf, sehr kurz, etwas länger als hoch; Schildchen schwach rundlich konvex, nur an der Basis gerandet und durch eine schmale, tiefe Querspalte vom Mesonotum getrennt

wie bei *Charops*; Propodeum nicht gefeldert, Luftlöcher gross, länglich elliptisch. Beine mässig dick; Klauen gekämmt. Hinterleib vom 2ten Segment an deutlich zusammengedrückt, das erste Segment schlank und lang, der Postpetiolus rundlich verdickt, Luftlöcher hinter der Mitte liegend, das 2te etwas kürzer als das erste. Bohrer kurz vorragend. Flügel mit sehr kleiner, lang gestielter Areola, Radialendabschnitt gerade; Nervulus hinter der Gabel; Nervellus ohne Ast, weit unter der Mitte schwach gekrümmt.

Genotypus: *Scenocharops longipetiolaris* UCH.

Durch die abstehende Areola im Vorderflügel schliesst die Gattung sich an *Xanthocampoplex* MORL. und *Campoplegidea* VIER. an, in allen Merkmalen ist sie jedoch ganz verschieden und ähnelt weit mehr der Gattung *Charops* HOLMGR., von dieser ist sie aber durch das schwach erhabene Schildchen und die kleine, lang gestielte Areola verschieden.

Campoplegidea melanocerus sp. nov.

♂. Kopf quer, hinter den Augen verengt; dicht gerunzelt, ziemlich dicht weisslich pubescent; Clypeus flach, vorn breit abgerundet; Mandibeln mit gleichen Zähnen. Mesonotum matt, dicht fein runzelig punktiert; Schildchen flach gewölbt, an der Basis gerandet; Mesopleuren punktiert; Propodeum gerunzelt, in der Mitte der Länge nach schwach gefurcht, mit kräftiger Basalleiste, das Ende des Propodeums ziemlich vorragend. Hinterleib glatt, das erste Segment glänzend. Flügel hyalin; Stigma schmal, braun; Areola gross, kurz gestielt, den Rücklaufendenerv in der Mitte aufnehmend. Körperlänge: 10 mm.

Schwarz. Mandibeln, Palpen, Vorder- und Mittelbeine und Hinterschienen gelbbraun. Mandibelzähne schwärzlich, alle Hüften und die Hinterschenkel schwarz, die Hintertarsen und -trochantern schwarzbraun. Hinterleib rötlichbraun, das erste und 2te Segment schwarz.

Fundort: Amping (1 ♂, I, 1910).

Unterscheidet sich von der folgenden Art durch die gelb gefärbten 4 Vorderbeine.

Campoplegidea minima MORL.

Campoplex minimus MORLEY, Faun. Brit. Ind. Hym. I, Vol. III, Ichn. I, p. 453, ♀ ♂ (1913).

Fundort: Kankau (1 ♂, am 7, IV, 1912).

Campoplegidea erythra sp. nov.

♀, ♂. Kopf quer; Scheitel schmal, Gesicht dicht gerunzelt; Mandi-

beln mit gleichen Zähnen. Antennen so lang wie der Körper, gegen die Spitze zu verdünnt. Mesonotum dicht runzelig punktiert, matt, ohne Parapsiden; Schildchen rundlich, nur an der Basis seitlich gerandet, Mesopleuren punktiert; in der Mitte zum Teil dicht längsgerunzelt; Propodeum in der Mitte längsgefurcht, dicht fein weisslich pubescent wie beim Schildchen, dicht fein runzelig punktiert, die Basalquerleiste schwach angedeutet. Flügel hyalin, nur am Randmal leicht bräunlich getrübt; Stigma und Nerven dunkel rotbraun; Areola gross, mit kurzem Petiolus; Nervulus hinter der Gabel; Nervellus nicht gebrochen. Beine schlank, die Hinterschienen mit feinen Borsten, ihre Endsporen etwas kürzer als das Metatarsus. Das erste Segment nach oben schwach gebogen, unten an der Basis etwas eingeschnürt, an der Spitze wenig gewölbt, das 2te kürzer als das erste; Thyridien elliptisch. Bohrer sehr kurz. Körperlänge: 11 mm.

Schwarz. Fühler schwarzbraun; Schaft, Pedicellus und Annellus gelbbraun; Mandibeln grösstenteils, Palpen und Beine gelb, die Mittelhüften an der Basis und die hintersten ganz schwarz, die Hinterschienen am Ende und ihre Tarsen dunkelbraun, die Hinterschienenendsporen blassgelb, etwas kürzer als das Metatarsus. Hinterleib rot, das erste Segment ganz und das 2te am Rücken schwarz.

Fundorte: Kankau (2 ♀, IV, 1912); Hôzan (1 ♂, II, 1910); Taihorin (1 ♂, V, 1910).

Campoplegidea sauteri sp. nov.

♀, ♂. Kopf quer, dicht runzelig. Antennen fast von Körperlänge, ganz schwarz. Mesonotum matt, dicht runzelig punktiert; Schildchen an der Basis gerandet; Mesopleuren punktiert, oben zum Teil runzelig; Propodeum dicht runzelig, in der Mitte längsgefurcht, die Basalquerleiste ziemlich kräftig. Flügel gelblich hyalin; Stigma und Nerven schwarzbraun; Areola mit langem Petiolus, den rücklaufenden Nerv in der Mitte aufnehmend; Nervellus nicht gebrochen. Körperlänge: 9–10 mm.

Schwarz. Beine und Hinterleib rot; alle Hüften, das erste Segment ganz und das 2te oben schwarz, die Hinterbeine zum Teil mehr oder minder verdunkelt.

Fundorte: Taihorin (1 ♀, 8 ♂, V, 1910); Hôzan (1 ♂, V, 1910).

Unterscheidet sich von der vorigen Art durch den schwarzen Schaft.

Hymenobosmina posticae Sonan

Hymenobosmina posticae Sonan, Trans. Nat. Hist. Soc. Formosa, XIV, p. 415, ♀ ♂ (1929).

Fundorte: Taihorin (3 ♀, I, IV, 1910; 3 ♂, V, 1910); Tainan (2 ♀,

3 ♂, IV, 1912); Kankau (1 ♂, VI, 1912). Diese Art ist Schmarotzer von *Notolophus posticus* Wk.

Eriborus perfidus Grav.

Campoplex perfidus Gravenhorst, Ichn. Eur., III, p. 595, ♀ (1829).
Anilasta perfida Thomson, Opusc. Ent., IX, p. 1175, ♀ (1887).
Eriborus perfidus Schmiedeknecht, Opusc. Ichn., p. 1644 (1909); Morley (non *Erioborus*), Ind. Faun. Hym., III, Ichn. I, p. 469, ♀ (1913).

Fundorte: Taihorin (1 ♀, V, 1910); Amping (1 ♀, V, 1910).

Dioctes vulgaris Morl.

Dioctes vulgaris Morley, Ind. Faun. Hym. III, Ichn. I, p. 472, ♀ ♂ (1913); Uchida, Journ. Fac. Agr., Hokkaido Imp. Univ., XXI, p. 281 (1928).

Fundorte: Taihorin (1 ♀, V, 1910; 1 ♂, am 7. VI; 1 ♂, am 7. XI, 1911); Amping (1 ♂, I, 1910); Kankau (1 ♂, am 7. IV, 1912).

Dioctes nigriabdominalis sp. nov.

♀, ♂. Kopf nach hinten verengt, dicht fein weisslich pubescent und dicht fein punktiert. Fühler gegen die Spitze zu verdünnt. Thorax matt, dicht fein punktiert und weisslich behaart wie beim Kopf; Schildchen flach gewölbt, nicht gerandet; Parapsiden fehlend; Propodeum oben runzelig punktiert; Area superomedia länger als breit, pentagonal, hinten ausgerandet, Costula weit vor der Mitte; Luftlöcher rundlich. Beine lang, die Hinterschienenendsporen länger als die halbe Länge des Metatarsus. Hinterleib linear, glatt, gegen das Ende etwas glänzend. Bohrer länger als das Basalsegment des Hinterleibs. Flügel hyalin; Stigma und Nerven dunkelbraun; Radialendabschnitt gerade; Nervulus ein wenig hinter der Gabel; Nervellus nicht gebrochen, nach aussen schwach gebogen. Körperlänge: 7–9 mm.

Schwarz. Mandibeln mit Ausnahme der Spitze, Palpen, Tegulen und beim Männchen der Schaft unten gelb; Beine gelbrot, die 4 vorderen mehr gelb, die Hinterschenkel rot, die Mittel- und Hinterhüften, Hintertrochantern und ihre Schienen an Basis und Spitze, die Mittelhüften nur am Ende gelbbraun, die Hintertarsen dunkelbraun.

Fundorte: Tainan (1 ♂, am 7. V, 1912); Kôsempo (1 ♀, X, 1911).

Das Tier schliesst sich eng an *D. lineatus* Ishida an, weicht aber von ihm durch die Skulptur des Propodeums und die Färbung der Beine ab.

Casinaria insularis sp. nov.

♀, ♂. Kopf quer, kaum breiter als der Thorax, nach hinten verengt;

Gesicht und Stirn dicht runzelig; innere Augenränder neben den Fühlern ausgerandet; Clypeus schwach konvex, vorn abgerundet. Fühler fadenförmig, deutlich kürzer als der Körper. Thorax ganz matt, weisslich fein pubescent wie beim Kopf; Mesonotum ohne Parapsiden, dicht fein runzelig punktiert; Schildchen schwach rundlich konvex; Mesopleuren in der Mitte zum Teil grob gerunzelt; Propodeum schräg abfallend, nicht gefeldert. Hinterleib linear, viel länger als Kopf und Thorax zusammen, der Postpetiolus rundlich gewölbt. Bohrer fast versteckt. Flügel hyalin; Stigma schmal; Radialnerv nicht gekrümmt, der Endabschnitt etwas länger als der Basalabschnitt; Areola kurz gestielt; Nervulus hinter der Gabel; Nervellus nicht gebrochen, postfurkal. Körperlänge: 8–9,5 mm.

Schwarz und matt. Schaft unten und Hinterleib dunkel rotbraun, das erste Segment ganz und die Rückenseite des Hinterleibs zum Teil schwarz. Mandibeln, Palpen, Tegulen und alle Trochantern gelblich, die Hintertrochantern an der Basis schwärzlich; Beine mit Ausnahme der Hüften rot, aber die 4 vorderen gelblichrot und die Hinterschienen und -tarsen dunkelbraun.

Fundorte: Taihorin (2 ♂, 1 ♀, I, 1910; 2 ♂, am 7. VII, 1911; 1 ♂, am 7. XI, 1911; 1 ♂, am 7. XII, 1911); Kankau (1 ♂, VIII, 1912); Suishario (1 ♂, X, 1911); Chosokei (1 ♂, 1914); Amping (2 ♂, I, 1910).

Unterscheidet sich von *C. albibasalis* UCH. durch die Färbung der Hinterschienen und -tarsen.

Casinaria longiabdominalis sp. nov.

♀. Kopf und Thorax dicht fein weisslich pubescent und dicht punktiert, ganz matt, der erstere quer, hinter den Augen verengt; Clypeus flach, vorn fast abgestutzt. Schildchen rundlich konvex; Propodeum mässig kurz, mit 2 Längskielen. Hinterleib schlank und lang. Bohrer versteckt. Flügel hyalin; Stigma und Radialzelle schmal; Basalendabschnitt des Radius deutlich kürzer als der Endabschnitt; Areola klein, kurz gestielt; Nervulus hinter der Gabel; Nervellus nicht gebrochen.

Schwach. Sämtliche Schienen und Tarsen dunkelbraun. Hinterleib rot, das erste Segment ganz und das 2te mit Ausnahme des Hinterrands schwarz. Körperlänge: 10 mm.

Fundort: Taihorin (1 ♀, am 7. VII, 1911).

Unterscheidet sich von der vorigen Art durch die schwarzen Beine.

Limnerium sauteri sp. nov.

♀. Kopf spärlich fein runzelig; Gesicht gräulich pubescent. Fühler fadenförmig, fast von $^2/_3$ der Körperlänge. Thorax matt; Mesonotum dicht

fein gerunzelt; Parapsiden fehlend; Schildchen rundlich konvex, glatt, nicht gerandet; Mesopleuren oben gerunzelt, unten spärlich punktiert, das Speculum deutlich; Propodeum in der Mitte breit und deutlich längsgefurcht, die Luftlöcher rundlich. Hinterleib glatt, das erste Segment am Ende rundlich aufgetrieben. Bohrer so lang wie das erste Hinterleibssegment. Flügel hyalin; Stigma schmal; Areola klein, deutlich gestielt; Basalabschnitt des Radius kürzer als der gerade Endabschnitt; Nervulus interstitial; Nervellus nicht gebrochen, leicht antefurkal. Körperlänge: 8 mm.

Schwarz und matt. Mandibeln, Palpen, Tegulen und Beine gelbbraun, die Vorder- und Mittelhüften ganz, ihre Trochanten nur an der Basis, ihre Schienen an Basis und Spitze und die Tarsen mit Ausnahme des Metatarsus schwarz, die Hinterschenkel rotbraun; Mandibeln am Ende dunkelbraun.

Fundort: Taihorin (1 ♀, am 7. XI, 1911).

Unterscheidet sich von *L. exartemae* Uch. durch die gelben Vorderhüften.

Anilastus formosanus sp. nov.

♀. Kopf quer, dicht fein runzelig punktiert. Mesonotum ohne Parapsiden, fein pubescent; Schildchen runzelig, nicht gerandet; Mesopleuren dicht gerunzelt, das Speculum deutlich; Propodeum dicht grob gerunzelt, Area superomedia pentagonal. Flügel hyalin; Areola lang gestielt, klein; Endabschnitt des Radius gerade, länger als der Basalabschnitt; Nervellus nicht gebrochen, vertikal. Hinterleib glatt, das 2te Segment an der Basis schwach eingedrückt; Gastrocölen gross und lang. Bohrer versteckt.

Schwarz und matt. Schaft unten dunkelbraun. Mandibeln, Palpen, Tegulen und Beine gelblich, die Hinterhüften schwarz, ihre Schenkel rotbraun, ihre Schienen an Basis und Spitze sowie auch die Tarsen schwärzlich, aber der Metatarsus an der Basalhälfte gelblich. Körperlänge: 7 mm.

Fundort: Taihorin (1 ♀, V, 1910).

Anilastus taihorinensis sp. nov.

♀. Kopf schmäler als der Thorax, deutlich quer, hinter den Augen stark verschmälert; Stirn und Gesicht dicht runzelig punktiert. Fühler fadenförmig. Thorax kurz, etwas länger als hoch, dicht grob runzelig; Schildchen rundlich, dicht gerunzelt, die Basalfurche schmal und tief; Propodeum hinten abfallend, Area superomedia mässig gross, pentagonal. Hinterleib kurz und robust. Bohrer versteckt. Flügel hyalin; Areola klein; Nervulus hinter der Gabel, deutlich schräg; Nervellus nicht gebrochen, schwach gebogen. Körperlänge: 6,5 mm.

Schwarz. Hinterleib rot, das erste Segment ganz und das 2te mit Ausnahme des Hinterrands schwarz. Fühler bräunlich. Tegulen und Mandibeln dunkel gelbbraun. Beine gelbrot, alle Hüften schwarz, die Hinterbeine dunkel rotbraun.

Fundort: Taihorin (1 ♀, am 7. IX, 1911).

Holocremnus geniculatus sp. nov.

♂. Kopf nach hinten kaum verschmälert oder etwas rundlich verengt; Schläfen und Wangen leicht aufgetrieben; Gesicht und Stirn dicht fein runzelig punktiert und pubescent; Clypeus vorn breit abgerundet; Mandibeln dick. Antennen fast von ⅓ der Körperlänge, gegen die Spitze zu verdünnt. Mesonotum lederartig; Mesopleuren schwach glänzend, zerstreut punktiert, aber oben zum Teil runzelig; Propodeum deutlich gefeldert, Costula kräftig. Flügel hyalin; Radialzelle kurz; Areola mässig gross, nicht gestielt, rhomboidisch; Diskokubitalnerv in der Mitte gekrümmt, zuweilen an dieser Stelle mit kleinem Ramellus; Nervulus hinter der Gabel; Nervellus nicht gebrochen.

Schwarz. Schaft unten an der Spitze bräunlich. Mandibeln, mit Ausnahme der Spitze, Palpen, Tegulen und Vorder- und Mittelbeine gelb, die Hinterbeine rötlich, die 4 vorderen Hüften an der Basis und die hintersten ganz schwarz, die Hinterschenkel und -schienen am Ende und ihre Tarsen schwärzlichbraun, die Trochantern und Tarsen an der Basis gelblich. Hinterleib in der Mitte zum Teil bräunlich. Körperlänge: 7 mm.

Fundort: Taihorin (7 ♂, am 7. VII, 1911; 6 ♂, 2, 1910).

Verwandt mit *H. nematorum* TSCHEK., unterscheidet sich jedoch von ihm durch den ganz schwarz gefärbten Schaft.

Uuterfamilie TRYPHONINAE

Metopius (Ceratopius) baibarensis UCH.

Metopius (Ceratopius) baibarensis UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., Vol. XXV, p. 250, ♀ ♂ (1930).

Fundort: Taihorin (1 ♂, am 10. I, 1910).

Metopius (Ceratopius) rufus CAM. f. *kakogawanus* MATS.

Metopius kakogawanus MATSUMURA, Thous. Ins. Jap. Suppl. IV, p. 100, Pl. XLVI, fig. 18, ♀ (1912).

Metopius rufus SONAN (nec CAMERON), Taiwan Nojiho, 219, p. 13, ♀ (1925).

Metopius (Ceratopius) formosanus CLÉMENT, Konowia, VII, p. 40 (1929).

Metopius (Ceratopius) rufus UCHIDA (nec CAMERON), Journ. Fac. Agr., Hokkaido Imp. Univ. XXV, p. 248, ♀ ♂ (1930).

Fundort: Kankau (1 ♀, am 22. IV, 1912; 1 ♂, am 7. IV, 1912). Diese Art verbreitet über *unser ganzes faunistisches Gebiet.*

Colpotrochia pilosa CAM.

Incsera pilosa CAMERON, Journ. Bombay Nat. Hist. Soc., p. 724, ♀ ♂ (1909).
Colpotrochia pilosa MORLEY, Faun. Brit. Ind. Hym. III, Ichin. I, p. 307, ♀ (1913); UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 262, ♀ (1930).

Fundort: Kankau (2 ♂, VII; 9 ♂, IX, 1912).

Metacoelus formosanus UCH.

Metacoelus formosanus UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 266, ♀ (1930).

Fundort: Kankau (1 ♀, am 22· IV, 1912).

Triclistus dimidiatus MORL.

Triclistus dimidiatus MORLEY, Faun. Brit. Ind., Hym. III, Ichn. I, p. 301, ♀ (1913).

Fundorte: Taihorin (1 ♀, I, 1910; 1 ♀, am 7. XI; 1 ♀, am 7. XII, 1911); Kosempo (1 ♀, 4 ♂, V, 1912).

Das Männchen stimmt mit dem Weibchen ganz überein. Nach der MORLEY'schen Beschreibung sind die Hintertarsen fast schwarz, aber beim Stück aus Formosa sind sie ganz rot gefärbt und die Area superomedia im Propodeum ist mehr als 2 mal so lang als breit.

Triclistus parallelus sp. nov.

♀. Kopf hinter den Augen verlängert, etwas verschmälert und schmaler als der Thorax; Gesicht zerstreut punktiert. Fühler fadenförmig, fast von der halben Körperlänge. Thorax nach vorn zu verengt, fein pubescent; Propleuren breit und tief eingedrückt, glatt, strak glänzend; Mesonotum und Schildchen flach, lederartig fein punktiert; Parapsidenfurchen fehlend; Mesopleuren glatt, unten zum Teil zerstreut punktiert; Propodeum glatt, glänzend, besonders Area superomedia und petiolaris, die erstere 2 mal so lang wie breit; Costula fehlt ganz; Luftlöcher ziemlich gross, rundlich oval. Hinterleib schwach glänzend, spärlich fein punktiert, so lang wie Kopf und Thorax zusammen, das erste Segment an der Basis mit 2 schwachen kurzen Kielen, am Rücken nahe dem Ende quereingedrückt. Bohrer ganz versteckt. Flügel hyalin; Stigma dunkelbraun; Areola kurz gestielt; Nervellus nahe dem Ende gekrümmt.

Körperlänge: 6,5 mm.

Schwarz. Fühler und Mandibeln braun, gegen die Spitze zu verdunkelt. Mittelkiel der Stirn bräunlich. Palpen, Tegulen, Flügelwurzel, Beine

und Bauchseite des Hinterleibs gelbbraun; alle Hinterleibssegmente je am Hinterrand schmal rotbraun gesäumt.

Fundort: Kankau (1 ♀, am 7. IV, 1912).

Unterscheidet sich von *T. aitkeni* CAM. durch die viel längere Area superomedia.

Triclistus taiwanensis sp. nov.

♀. Kopf nach hinten verengt, glatt, glänzend; Stirn fein punktiert, in der Mitte mit braunem Kiel; Gesicht ganz matt, dicht fein punktiert und fein pubescent. Antennen fadenförmig, kurz. Thorax breiter als der Kopf; Parapsiden fehlend; Mesopleuren zerstreut punktiert; Propodeum kurz, Area superomedia länger als breit, nach vorn zu verschmälert; Costula fehlt; Luftlöcher klein, rundlich. Hinterleib glatt, glänzend. Bohrer versteckt. Stigma im Vorderflügel breit; Radialzelle kurz; Areola kurz gestielt. Körperlänge: 4,5 mm.

Schwarz. Fühler, Mandibeln, Palpen, Beine, Bauchseite des Hinterleibs, Tegulen und Flügelwurzel gelbbraun. Stigma dunkelbraun.

Fundort: Taihorin (1 ♀, am 7. IV, 1911). Das Tier schliesst sich eng an die vorhergehende Art an, weicht aber von ihr durch die Form von Area superomedia und Radialzelle und die Skulptur der Mesopleuren ab.

Exochus oshimensis UCH.

Exochus oshimensis UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 267, ♀ ♂ (1930).

Fundort: Taihorin (3 ♀, V, 1910).

Exochus radialis sp. nov.

♀. Kopf quer, hinter den Augen rundlich verschmälert, glatt, glänzend; Gesicht punktiert und fein pubescent. Fühler fadenförmig, kaum länger als der halbe Körper. Thorax ein wenig breiter als der Kopf; Mesonotum fein behaart, schwach glänzend; Parapsidenfurchen fehlend; Pleuren glatt, deutlich glänzend; Schildchen flach gewölbt; Luftlöcher oval und klein; Area superomedia länger als breit, Costula vor der Mitte. Hinterleib glatt und glänzend. Bohrer kurz vorragend. Flügel hyalin; Radialzelle kurz; Nervellus weit unter der Mitte gekrümmt. Körperlänge: 4 mm.

Schwarz und glänzend. Schaft unten, Gesicht, 2 kleine Flecken auf dem Scheitel, Clypeus, Wangen und Palpen rein gelb; Beine gelbrot, die 4

vorderen Hüften, die Vorderschienen, alle Tarsen und die Mittel- und Hinterschienen nur an jeder Basalhälfte hellgelb; je ein Makel vor und unter den Flügeln, Tegulen und Flügelwurzel gelbbraun. Bohrer braun. Das 2te und 3te Hinterleibssegment am Endrand bräunlich. Stigma und Nerven dunkelbraun. Hinterhüften schwarz.

Fundort: Taihorin (1 ♀, V, 1910).

Unterscheidet sich von *E. parca* MORL. durch den glänzenden Thorax.

Exochus suishanus sp. nov.

♀. Das Tierchen ist verwandt mit der vorigen Art, unterscheidet sich jedoch von ihr durch die folgenden Merkmale:

1) Radialzelle verlängert, an der Spitze stark zugespitzt.

2) Schildchen am Ende und das Hinterschildchen gelbbraun.

3) Hinterhüften ganz gelbrot. Körperlänge: 6 mm.

Fundort: Suishario (1 ♀, X, 1911).

Orthocentrus carinatus sp. nov.

♂. Kopf glatt, glänzend, hinter den Augen rundlich verschmälert; Occiput deutlich ausgerandet; Gesicht länger als breit, spärlich punktiert; Clypeus vorn verschmälert; Wangen deutlich lang. Fühler fast von Körperlänge, der Schaft cylindrisch, das erste Geisselglied etwas länger als das 2te. Thorax glatt, glänzend, besonders die Seiten; Mesopleuren fein weisslich pubescent; Parapsidenfurchen nur vorn schwach angedeutet; Schildchen rundlich konvex, nicht gerandet; Area superomedia länger als breit, mit parallelen Seiten; Costula fehlend; Luftlöcher rundlich. Hinterleib flach gedrückt, mit parallelen Seiten, die 2 Basalsegmente runzelig, das erste in der Mitte schwach eingeschnürt und mit 2 Längsleisten, die Luftlöcher vor der Mitte liegend; das 2te und 3te hinter der Mitte schwach quereingedrückt, die übrigen fast glatt. Flügel hyalin; Areola pentagonal; Nervus parallelus etwas unter der Mitte der Brachialzelle vorspringend; Nervellus nicht gebrochen, antefurkal.

Schwarz und glänzend. Fühler dunkel gelbbraun; Schaft, Gesicht, Wagen, Clypeus, Palpen, Vorder- und Mittelbeine, Tegulen, Flügelwurzel, Bauchseite des Hinterleibs, Prosternum und Mesonotum zum Teil gelb; Hinterbeine gelbrot, ihre Hüften oft dunkel rotbraun. Hinterleib in der Mitte bräunlich, das 2te und 3te Segment am Hinterrand schmal gelbbraun. Körperlänge: 3,5 mm.

Unterscheidet sich von *O. patulus* HOLMGR. durch die gelben Beine.

Fundorte: Taihorin (1 ♂, V, 1910); Amping (1 ♂, I, 1910).

Bassus laetatorius F.

Ichneumon laetatorius FABRICIUS, Spec. Ins., I, p. 424 (1781).

Ichneumon dichrous SCHRANK, Enum. Ins. Austr., p. 352, ♂ (1781).

Bassus laetatorius PANZER, Krit. Revis., II, p. 74 (1807); GRAVENHORST, Ichn. Eur., III, p. 353 (1829); VOLLENHOVEN, Pinacogr., I, p. 3, Taf. I, fig. I (1875); THOMSON, Opusc. Ent., XIV, p. 1470 (1890); DALLA TORRE, Cat. Hym., III, p. 248 (1901); MORLEY, Brit. Ichn., IV, p. 82 (1911); id., Faun. Brit. Ind. Hym. III, Ichn. I, p. 276 (1913); id., Rev. Ich., III, p. 125 (1914); SONAN, Taiwan Noji-ho, 219, p. 11 (1925); SCHMIEDEKNECHT, Opusc. Ichn., p. 3345 (1926); UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 255 (1930).

Anomalon laetatorius JURINE, Nouv. Méth., p. 116 (1807).

Bassus albovarius WOLLASTON, Ann. Mag. Nat. Hist., p. 23 (1858).

Bassus tripicticrus WALSH, Trans. Acad. Louis, p. 85 (1873).

Bassus venustulus SAUSSURE, Grand. Hist. Madag., p. 15 (1878).

Scolobates varipes SMITH, Trans. Ent. Soc. Lond., p. 8 (1878).

Diplazon laetatorius KELLY, Journ. Econ. Ent., VII, p. 294 (1914); ISHII, Ins. World, Gifu, XXV, p. 22 (1921).

Fundorte: Taihoku (2 ♀, IV, 1912); Tainan (1 ♀, V, 1912); Taihorin (3 ♀, V, 1910; 1 ♂, I, 1910).

Bassus orientalis CAM.

Bassus orientalis CAMERON, Spol. Zell., p. 131, ♂ (1905); MORLEY, Faun. Brit. Ind. Hym. III, Ichn. I, p. 280, ♀ ♂ (1913); id., Rev. Ichn., III, p. 127 (1914).

Fundorte: Taihorin (6 ♀, 5 ♂, V, 1910); Hôzan (1 ♂, II, 1910); Amping (1 ♀, V, 1910).

Homocidus ornatus GRAV.

Bassus deplanatus GRAVENHORST, Ichn. Eur., III, p. 340, ♀ (1829).

Bassus ornatus GRAVENHORST, l. c., III, p. 341, ♂ (1829).

Homotropus ornatus THOMSON, Opusc. Ent., XIV, p. 1505, ♀ ♂ (1890).

Hymocidus ornatus MORLEY, Brit. Ichn., IV, p. 99, (1911); id., Faun. Brit. Ind. Hym. III, Ichn. I, p. 285, ♀ ♂ (1913); SCHMIEDEKNECHT, Opusc. Ichn., p. 3422, ♀ ♂ (1926).

Fundort: Taihorin (1 ♂, V, 1910).

Homocidus tarsatorius PANZ.

Bassus tarsatorius PANZER, Ins. Germ., IX, p. 102 (1809).

Bassus exultans GRAVENHORST, Ichn. Eur., III, p. 328, ♂ (1829).

Bassus insignis GRAVENHORST, l. c., III, p. 349, ♀ (1829).

Bassus pulchellus DESVIGNES (nec HOLMGREN), Trans. Ent. Soc. Lond., p. 221, ♂ (1862).

Bassus desvignesii MARSHALL, Cat. Brit. Hym., p. 82 (1872).

Homotropus tarsatorius THOMSON, Opusc. Ent., XIV, p. 1503, ♀ ♂ (1890); DALLA TORRE, Cat. Hym., Vol., III, p. 239 (1901); HABERMEHL, Konowia, IV, p. 267 (1925).

Bassus indicus CAMERON, Journ. Bom. Nat. Hist. Soc., p. 728, ♂ (1909).

Bomosidus tarusatoris MORLEY, Brit. Ich., IV, p. 97, ♀ ♂ (1911); id., Faun. Brit. Ind. Hym. Ichn. I, p. 283, ♀ ♂ (1913); id., Rev. Ichn., III, p. 129 (1914); SCHMIEDEKNECHT, Opusc. Ichn., p. 3416 (1926); UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 259 (1930).

Fundort: Taihorin (2 ♀, 1 ♂, V, 1910; 1 ♀, am 7. VI, 1911).

Bemerkung: Eine neue Art dieser Gattung, *H. takaozanus* aus Honshu, welche ich in meiner Arbeit „Viert. Beit. Kennt. Ichn.-Faun. Jap., p. 259, 1930" beschrieben habe, ist eine Form von *H. cinctus* GRAV. (Ichn. Eur., III, p. 341, 1829).

Scolobates testaceus MORL.

Scolobates testaceus MORLEY, Faun. Brit. Ind., Hym. Ichn. I, p. 339, ♀ (1913).

Fundort: Taihorin (1 ♂, am 7. II, 1911).

Perilissoides cubitalis sp. nov.

♂. Kopf quer, hinter den Augen rundlich aufgetrieben, glatt; Stirn runzelig; Gesicht runzelig punktiert; Clypeus zerstreut punktiert, vorn zugerundet; innere Augenränder nicht ausgerandet. Fühler fast von Körperlänge. Thorax ziemlich robust, schwach glänzend, spärlich fein punktiert; Parapsidenfurchen nur vorn angedeutet; Epomia undeutlich. Area

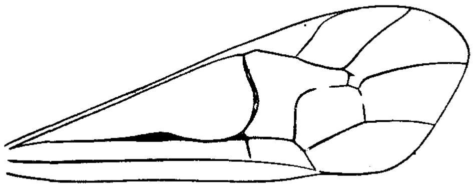


Fig. 21

Vorderflügel von *Perilissoides cubitalis* UCH.

superomedia länger als breit, Costula vor der Mitte.

Gelbrot wie bei Ophioninen-Arten. Mandibeln an der Spitze schwarz. Palpen blassgelb. Nerven und Stigma gelbbraun. Körperlänge: 10 mm.

Fundort: Taihorin (1 ♂, am 7. XI, 1911). Das Weibchen noch nicht bekannt.

Perilissoides gen. nov.

Kopf quer, leicht aufgetrieben; Fühler schlank, lang und fadenförmig: Clypeus nicht scharf vom Gesicht getrennt; die Mandibelzähne ungleich, der untere länger als der obere. Parapsidenfurchen fast fehlend; Schildchen nur an der Basis gerandet, die Basalfurche breit und tief. Flügel mässig

breit; Stigma dreieckig; Areola klein, gestielt; Kubitalader in der Mitte deutlich verdickt und nach oben gekrümmt, die Basalader verdickt und nach aussen stark gebogen; Nervellus weit oberhalb der Mitte gebrochen; postfurkal. Klauen gekämmt. Propodeum vollständig gefeldert, die Luftlöcher klein und rund. Hinterleib vom 3ten Segment an zusammengedrückt, das erste Segment stielartig, ohne Rückenkiel, mit deutlichen Seitengruben an der Basis, die Luftlöcher etwas vor der Mitte liegend.

Genotypus: *Perilissoides cubitalis* UCH.

Diese Gattung schliesst sich eng an Perilissus HOLMGR. *an, weicht* aber von ihm durch die deutlich verdickte und gebogene Kubital- und Basalader sowie auch die gekämmten Klauen ab.

Perilissus formosensis sp. nov.

♀, ♂. Kopf dicht punktiert, nach hinten nicht verengt; Gesicht dicht und Clypeus zerstreut punktiert; Mandibeln gross, der untere Zahn grösser als der obere. Fühler schlank, von Körperlänge. Thorax dicht fein punktiert und fein weisslich behaart; Propodeum deutlich kleiner als der Mesothorax, ganz gefeldert, Area superomedia pentagonal, länger als breit, Costula vor der Mitte. Flügel hyalin; Radialzelle fast dreiekig; Areola kurz gestielt; Nervellus in oder etwas über der Mitte gebrochen. Hinterleib glatt, an der Basis fein punktiert. Bohrer fast versteckt.

Schwarz. Fühler dunkelbraun; beim Männchen schwärzlich; Schaft und Mandibeln braun. Beine gelbbraun, die hintersten mehr oder weniger verdunkelt; Hinterleib in der Mitte schwärzlichbraun. Körperlänge: 6–7 mm.

Fundorte: Taihorin (1 ♀, am 7. XII, 1911; 3 ♂, I, 1910); Taihoku (2 ♂, VI, 1912).

Mesoleptus sauteri sp. nov.

♀, ♂. Kopf nach hinten nicht verschmälert; Scheitel mit feinen Punkten, matt; Gesicht dicht punktiert, in der Mitte runzelig; Stirn fein runzelig punktiert; Clypeus glatt, schwach glänzend, mit einigen feinen Punkten, vorn breit abgerundet; Mandibeln lang, die unteren Zähne länger als die oberen. Antennen von Körperlänge, fadenförmig, dicht fein pubescent. Thorax fein punktiert; Mesopleuren glänzend; Schildchen nicht gerandet; Propodeum nur mit 2 undeutlichen Längskielen. Das erste Segment an der Basalhälfte stielartig verschmälert; Bohrer kurz vorragend. Flügel ohne Areola; Nervellus unter der Mitte gebrochen. Körperlänge: 8–9 mm.

Kopf schwarz; Gesicht schwarzbraun; Clypeus, Schaft, Fühler an der Basis, Mandibeln mit Ausnahme der Spitze, Palpen, Schildchen, Tegulen,

Flügelwurzel und je ein Fleck vor und unter den Flügeln gelb; Beine, Thorax und Hinterleib gelbrot; die Vorder- und Mittelhüften und ihre Trochantern gelblich, die Hinterschienen an der Spitze und ihre Tarsen bräunlich verdunkelt; Mesothorax und Propleuren bräunlichschwarz bis schwarz. Hinterleib vom 5ten Segment an schwarz. Nerven und Stigma braun.

Fundort: Kankau (4 ♀, 2 ♂, VIII-XI, 1912).

Mesoleptus taihorinensis sp. nov.

♀, ♂. Kopf quer, hinter den Augen leicht verschmälert; Stirn flach, fein runzelig; Gesicht quer, fein punktiert; Clypeus vorn breit abgerundet, glatt; Mandibeln dick. Fühler fadenförmig, von Körperlänge. Thorax etwas schmaler als der Kopf, fein weisslich pubescent, schwach glänzend; Parapsiden nur vorn schwach angedeutet; Mesopleuren zum Teil zerstreut fein und Propleuren grob punktiert; Propodeum nicht gefeldert, in der Mitte mit 2 nach hinten divergierenden Kielen. Flügel hyalin, ohne Areola; Nervellus in der Mitte gebrochen. Hinterleib an der Basis fein und unregelmässig gerunzelt, das erste Segment in der Mitte am Rücken mit 2 schwachen Kielen; Bohrer fast versteckt. Körperlänge: ♀ ♂ 8–9 mm.

Schwarz. Fühler dunkelbraun, unten gegen die Basis heller; Schaft unten gelblich; beim Männchen die Fühler schwärzlich. Clypeus, Mandibeln, Palpen, Tegulen und je ein Fleck vor und unter den Flügeln gelb. Beine rot, die Vorder- und Mittelhüften und ihre Trochantern gelblich, die Hinterschenkel am Ende, ihre Schienen an der Spitzenhälfte und die Tarsen schwärzlich. Das erste Hinterleibssegment nur am Hinterrand und die 2 folgenden ganz rot, das 4te schwärzlichbraun. Stigma und Nerven bräunlich.

Fundort: Taihorin (1 ♀, 2 ♂, V, 1910).

Thymaris taiwanensis sp. nov.

♂. Antennen länger als der Körper, 3-farbig (in der Mitte breit weiss, an der Spitzenhälfte schwärzlich und an der Basis braun); Schaft und Annellus weisslichgelb. Kopf hinter den Augen rundlich verschmälert; Occiput breit und ziemlich tief ausgerandet; Fühlergruben glatt, glänzend; Gesicht in der Mitte gewölbt, glatt; Clypeus rundlich konvex; Mandibeln schlank, der obere Zahn grösser als der untere. Augen fein pubescent. Thorax schmaler als der Kopf, dicht fein weisslich behaart wie beim Kopf; Parapsiden deutlich tief und lang; Scutellum nicht gerandet; Propodeum ganz gefeldert, Area superomedia 2 mal so lang wie breit, Costula vor der

Mitte. Flügel hyalin, ohne Areola; Nervellus unterhalb der Mitte gebrochen, antefurkal. Beine schlank. Das erste und 2te Segment dicht fein längsrissig. Klauen klein und einfach. Körperlänge: 7 mm.

Schwarz. Clypeus am Vorderrand, Mandibeln, Palpen, Halsrand, Vorder- und Mittelbeine, alle Schienenendsporen und Hintertarsen gelblich; Hinterbeine rot. Hinterleib schwärzlichbraun, die 2 Basalsegmente je am Hinterrand hell gelbbraun gesäumt. Tegulen gelblich.

Fundort: Taihorin (2 ♂, am 7. XI, 1911).

Monoblastus nigrifacies sp. nov.

♂. Kopf quer, dicht punktiert, hinter den Augen breit, nicht verschmälert; Stirn und Gesicht dicht grob punktiert; Mandibeln mit 2 ungleichen Zähnen, der untere viel grösser als der obere. Antennen von Körperlänge. Thorax so breit wie der Kopf, dicht punktiert, matt; Schildchen mässig gross, rundlich erhaben; Propodeum kurz, deutlich gefeldert, Area superomedia hexagonal, Costula in der Mitte. Flügel hyalin; Areola gross; Nervellus weit unter der Mitte gebrochen, antefurkal. Klauen gekämmt. Hinterleib punktiert, das erste Segment mit 2 kräftigen Längskielen. Körperlänge: 8 mm.

Schwarz. Antennen dunkelbraun; Schaft unten hell. Mandibeln in der Mitte rotbraun. Beine rot, die 4 vorderen gelblichrot, die hintersten Schienen und Tarsen verdunkelt. Hinterleib an der Basis (das erste und 2te Segment) hellrot. Stigma und Nerven dunkelbraun.

Fundort: Taihorin (1 ♂, am 7. XI, 1911).

Paniscus ocellaris Thoms.

Paniscus ocellaris Thomson, Opusc. Ent., XII, p. 1199, ♀ ♂ (1888); Morley, Faun. Brit. Ind. Hym. III, Ichn. I, p. 350, ♀ ♂ (1913); Uchida, Journ. Fac. Agr., Hokkaido Imp. Univ., XXI, p. 191, ♀ ♂ (1928).

Paniscus testaceus Gravenhorst var. *ocellaris* Kokujew, Horae Soc. Ent. Ross., XXXIV, p. 135 (1899).

Paniscus ferrugineus Cameron, Manch. Mem., p. 107, ♀ (1899.)

Paniscus longitarsis Cameron, l. c., p. 108, ♂ (1899).

Paniscus formosanus Matsumura, Thous. Ins. Jap. Suppl. IV, p. 115, Pl. XLVIII, fig. 4, ♂ (non ♀) (1912).

Paniscus unicolor Matsumura (nec Smith), l. c., p. 116, Pl. XLVIII, fig. 5, ♀ (1912).

Paniscus testaceus Gravenhorst var. *opaculus* Morley (nec Thomson), Rev. Ichn., II, p. 122, ♀ ♂ (1913).

Fundorte: Pilam (1 ♂, VIII, 1912); Suishario (1 ♀, X, 1911); Taihoku (1 ♀, IV, 1914); Taihorin (1 ♂, I, 1911).

Amebachia baibarana UCH.

Amebachia baibarana UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXI, p. 198, ♀ ♂ (1928).

Fundorte: Kôsempo (1 ♀, X, 1911; 1 ♀, am 7. XII, 1911); Kankau (1 ♂, am 7. IV, 1912); Tainan (1 ♀, am 7. V, 1912).

Anmerkung: Da der Untergattungsname *Erythrojoppa*, welche ich in dieser Arbeit, Seite 152, beschrieben habe, von P. CAMERON bereits im Jahre 1902 für eine andere Gattung benutzt wurde, habe ich ihr hier den neuen Name „*Akajoppa*" gegeben.

ADDENDA

(Mit 2 Figuren)

Das Material, welches ich für die vorliegenden Addenda benutzt habe, stammt aus der deponierten Sammlung der entomologichen Abteilung der staatlichen Museen für Tierkunde und Völkerkunde zu Dresden. Es wurde mir von diesem Museum zur Bearbeitung übergeben. Ich verdanke Herrn F. v. EMDEN die Veranlassung zu diesem Aufsatz. Die gesandten Stücke gehören 28 Arten und 23 Gattungen an, von denen eine Art neu ist, 2 Arten neu für Formosa sind und die 25 übrigen aus Formosa schon bekannt. Sie lauten wie folgt:

Unterfamilie ICHNEUMONINAE

Ischnojoppa luteator F.

Fundort: Lambeh (1 ♀, II, 1908). Diese Art ist ziemlich häufig in Formosa.

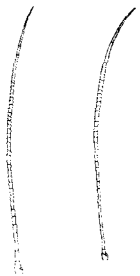
Acanthojoppa unicolor UCH.

Fundort: Pilam (1 ♂, II, 1908). Im Jahre 1929 habe ich diese Art in „Ins. Mats., Vol. III, p. 173" als eine Art von der Gattung *Togea* veröffentlicht.

Kobanus filicornis sp. nov.

♂. Kopf glänzend, zerstreut punktiert, hinter den Augen nicht verschmälert; Occiput breit und tief ausgerandet; Schläfen schwach aufgetrieben; Fühlergruben tief, glatt; Gesicht flach, grob punktiert; Clypeus nicht

vom Gesicht geschieden, vorn abgestutzt; Labrum vorragend; Mandibeln mit ungleichen Zähnen. Fühler kürzer als der Körper, fast fadenförmig, aber gegen das Ende zu nur wenig verdünnt, einige Basalgeisselglieder viel länger als breit, Schaft oval, hinten tief ausgeschnitten. Thorax fein gelb pubescent, matt, so breit wie der Kopf; Mesonotum dicht fein punktiert; Schildchen schwach rundlich konvex, beiderseits gerandet; Mesopleuren glänzend, grob punktiert; Epicnemia kräftig; Propodeum deutlich grob punktiert, ganz gefeldert, Area superomedia hufeisenförmig, Costula kräftig; Luftlöcher linear. Postpetiolus runzelig punktiert, in der Mitte grob längsgerunzelt, das 2te und 3te Segment dicht grob und das folgende spärlich punktiert, die übrigen glatt; Gastrocölen sehr gross und tief. Flügel gelb, am Ende dunkelbraun getrübt; Areola pentagonal, oben stark verschmälert; Ramellus klein; Nervulus hinter der Gabel; Nervellus unterhalb der Mitte gebrochen.



a b

Fig. 1

a. Fühler von *C. paridiolus* MATS. (♂).
b. Fühler von *C. falicornis* UCH. (♂).

Gelbrot. Fühler schwarz, Schaft unten dunkelbraun. Mandibeln an den Spitzen schwärzlich. Gesicht und Clypeus beiderseits, Mandibeln, Palpen und Augenränder gelblich. Hinterleib vom 4ten Segment an schwärzlichviolett.

Fundort: Kosempo (1 ♂, 1908). Das Weibchen nicht bekannt. Die Art kommt C. *palidiolus* MATS. am nächsten, unterscheidet sich aber von ihm durch die folgenden Merkmale: 1) Fühler nicht gesägt, fadenförmig, aber am Ende nur wenig verdünnt. 2) Flügel am Ende stark dunkelbraun getrübt. 3) Hinterleibsende schwarzviolett. Der Holotypus in der Sammlung der staatlichen Museen für Tierkunde und Völkerkunde zu Dresden.

Elasmognathias formosanus UCH.

Elasmognathias formosanus UCHIDA, Ins. Mats., Vol. IV, p. 122, ♀ ♂ (1930).

Fundort: Pilam (2 ♂, 1908). Die Art ist ziemlich käufig.

Stenichneumon (Stenichneumonoides) flavolineatus UCH.

Fundorte: Pilam (1 ♀, 1 ♂); Kosempo (4 ♀, 1908). Diese Art ist sehr häufig.

Bemerkung: In Zukunft möchte ich *Stenichneumonides* als eine Untergattung von *Stenichneumon* THOMS. behandeln.

Melanichneumon horishanus UCH.

Fundort: Takao (1 ♀, 1908). Da das Weibchen dieser Art bis jetzt noch nicht bekannt ist, gebe ich im folgenden die Beschreibung desselben: Kopf nach hinten rundlich verschmälert. Gesicht dicht grob punktiet; Clypeus vorn breit abgerundet, fast glatt; Stirn dicht punktiert. Thorax dicht punktiert; Schildchen flach. Area superomedia hexagonal, nach vorn verengt, Costula kräftig, hinter der Mitte. Die 3 Basalsegmente des Hinterleibs dicht punktiert, die übrigen glatt; Gastrocölen ziemlich klein. Bohrer kurz. Flügel hyalin; Stigma schwärzlich; Areola nach oben fast geschlossen. Antennen schlank, fadenförmig. Körperlänge: ♀ 12 mm.

Schwarz. Fühler in der Mitte weiss geringelt. Stirn beiderseits breit weiss gefleckt. Mandibeln und Vorderhüften und- trochantern bräunlichgelb; Palpen, Halsrand, Schildchen, Flügelwurzel, je eine Linie vor und unter den Flügeln, 3 Basalsegmente je am Endrand und das Hinterleibsende (das 5te-7te Segment) weiss. Beine rötlichbraun, die Hinterschenkel und -schienen je am Ende und die Tarsen schwärzlichbraun.

Takanona alboannulata UCH.

Fundorte: Lambeh (1 ♀, 1908); Pilam (1 ♀, 1908). Die Art ist sehr häufig.

Unterfamilie CRYPTINAE

Cryptus kankoensis UCH.

Fundort: Kosempo (2 ♀, 1998).

Friona okinawana UCH.

Fundort: Kosempo (1 ♂, 1908). Das Tierchen ist häufig in Okinawa und Formosa.

Stenaraeoides octocinctus ASH.

Fundort: Pilam (1 ♀, 1908).

Goryphus opacus SZÉPL.

Fundort: Pilam (2 ♀, 1908).

Gorypus longicornis ISHIDA

Fundort: Lambeh (2 ♀, 6 ♂, 1908).

Goryphus nigribasalis UCH.

Fundort: Pilam (1 ♀, 1908).

Mesostenus **(*Mesostenus*)** ***albosignats*** SZÈPL.

Fundort: Pilam (4 ♀, 1908).

Unterfamilie PIMPLINAE

Pimpla flavipalpis CAM.

Pimpla flavipalpis CAMERON, Manch. Mem., p. 174, ♀ ♂ (1899).
Exeristes flavipalpis MORLEY, Faun. Brit. Ind. Hym. III, Ich. I, p. 200, ♀ ♂ (1913).

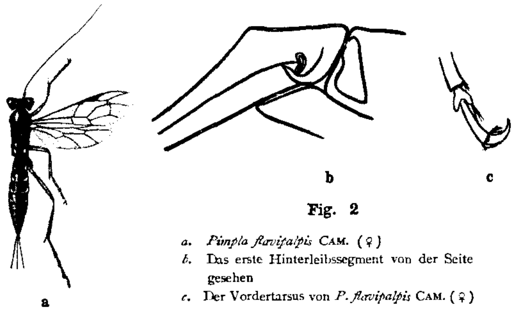


Fig. 2

a. *Pimpla flavipalpis* CAM. (♀)
b. Das erste Hinterleibssegment von der Seite gesehen
c. Der Vordertarsus von *P. flavipalpis* CAM. (♀)

Fundorte: Tappan (1 ♀, am 29. IV, 1907, S. MATSUMURA); Kosempo (2 ♀, 1908, H. SAUTER). Diese Art ist neu für Formosa.

Epiurus taiwanensis UCH.

Fundort: Pilam (1 ♀, 1908).

Echthromorpha notulatoria F.

Fundorte: Lambeh (3 ♂, 1903); Pilam (1 ♀, 1908). Die Art ist häufig im orientalischen Gebiet und schmarotzt bei den Larven von *Stilpnotia cygna* MOOR., *Metanastria punctata* WK. und *Hyblaea puera* CRAM.

Theronia zebroides KRIEG.

Theronia zebroides KRIEGER, Zeitschr. Hym. Dipt., p. 236 (1906).
Orientotheronia rufescens MORLEY, Faun. Brit. Ind., Hym. III, Ichn. I. p. 146 (1913).

Fundort: Kosempo (1 ♀, 1 ♂, 1908). Sie schmarotzt bei der Larve von *Hyblaea pucra* CRAM.

Xanthopimpla punctata F.

Fundorte: Takao (1 ♀, 1 ♂, 1908); Lambeh (1 ♀, 1908).

Xanthopimpla stemmator THUNB.

Fundorte: Lambeh (1 ♂, 1908); Takao (1 ♂, II, 1908).

Pseudeugalta* ***pilosa*** SZÉPL.

Acherocephalus pilosus SZÉPLIGETI, Ann. Mus. Nat. Hung., XII, p. 423, ♀ (1914).

Formoxorides pilosus UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 15, ♀ (2928).

Fundorte: Takao (1 ♀, 1908); Pilam (1 ♀, 1908).

Anmerkung: *Formoxorides*, welcher ich im Jahre 1928 in „Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 14" als neue Gattung festgestellt habe, ist nichts anders als ein Synonym von *Pseudeugalta* ASH. (Proc. U. S. Nat. Mus., XXIII, p. 55, 1900).

Syzeuctus indicus CAM.

Cryptus indicus CAMERON, Manch., Mem., p. 15, ♀ (1897); id., Entomol, p. 25 (1914).

Mesostenus annulipes CAMERON, Manch. Mem., p. 103, ♂ (1900).

Tanera annulipes CAMERON, Spolia Zeyl., p. 141, ♀ (1905); MORLEY, Faun Brit. Ind., Hym. III, Ichn. I, p. 57 (1913); UCHIDA, Journ. Fac. Agr., Hokkaido Imp. Univ., XXV, p. 92 (1928).

Syzeuctus annulipes MORLEY, Faun. Brit. Ind. Hym. III, Ichn. I, p. 236, ♀ (1913); SONAN, Trans. Nat. Hist. Soc. Formosa, XXII, p. 83 (1932).

Fundort: Pilam (1 ♀, 1908).

Leptobatopsis* ***planiscutellatus*** END.

Sauterellus planiscutellatus ENDERLEIN, Stett. Ent. Zeit., p. 113, ♀ ♂ (1912).

Leptobatopsis planiscutellatus CUSHMAN, Proc. U. S. Nat. Mus., LXIV, p. 6 (1924).

Fundort: Pilam (2 ♂, 1908).

Unterfamilie OPHIONINAE

Henicospilus reticulatus CAM.

Fundort: Pilam (1 ♀, 1908).

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* *Pseudeugalta* ASHMEAD, Proc. U. S. Nat. Mus., 23, p. 55 (1900).

** *Leptobatopsis* ASHMEAD, Proc. Linn. Soc. N. S. W., 25, p. 349 (1900).

Zacharops narangae Cush.

Fundort: Lambeh (1 ♀, II, 1908).

Campoplegidea kuroashii Uch.

Fundort: Lambeh (3 ♂, II, 1908).

Dioctes debilis Morl.

Dioctes debilis Morly, Faun. Brit. Ind. Hym. III, Ichn. I, p. 473, ♀ (1913).

Fundort: Lambeh (1 ♀, II, 1908). Diese Art ist neu für Formosa.

Unterfamilie TRYPHONINAE

Metopius (Ceratopius) rufus Cam. f. ***kagogawamus*** Mats.

Fundort: Pilam (1 ♂, 1908). Diese Art ist sehr häufig in Formosa und Honshu.

DIE JAPANISCHEN HYLOBIINEN (*COL. CURC.*)

VON

HIROMICHI KÔNO

(Mit 2 Tafeln)

In vorliegender Arbeit habe ich die Hylobiinen unserer Fauna, 37 Arten und 4 Unterarten, unter 11 Gattungen, von denen 4 Gattungen, 9 Arten und 2 Unterarten neu sind, behandelt.

Die Hylobiinen sind ohne Ausnahme Holz- oder Krautbohrer. Besonders die Holzbohrer sind sehr schädlich für den Waldbau. In der Forstwirtschaft werden vor allem *H. abietis haroldi* FAUST (in Honshu, Shikoku, Kiushu und Korea) und *H. pinastri karafutonis* KÔNO (in Sachalin und Hokkaido) an Konifern als häufige und sehr schädliche Insekten, sowie auch *H. freyi* ZUMPT (in Hokkaido und Honshu) an Obstbäumen und *H. okinawanus* KÔNO (in Okinawa) an *Cinnamomum camphora* als ziemlich schädlich angesehen.

Das Material, das ich bei diesem Studium benutzt habe, stammt zur Gänze aus der umfangreichen Sammlung des entomologischen Museums der kaiserlichen Hokkaido Universität; dasselbe wurde hauptsächlich von Herrn Prof. Dr. S. MATSUMURA und dem Autor, sowie von den nachstehenden Herren gesammelt: J. ADACHI, T. ADACHI, S. ARAKAWA, K. DOI, E. GALLOIS, S. HIRAYAMA, K. IGARASHI, Dr. S. ISSIKI, K. KAMIYA, T. KANO, M. KATO, T. KAWAKAMI, H. KAWAMURA, K. KIKUCHI, Dr. S. KUWAYAMA, Dr. Y. MIWA, M. NAKAMURA, T. OGASAWARA, R. SAITO, Dr. J. SHIBUYA, J. SONAN, Y. SUGIHARA, M. SUZUKI, H. TAKABAYASHI, S. TAKANO, K. TAMANUKI, Dr. T. UCHIDA, C. WATANABE und K. YASUMATSU.

Hiermit muss ich Herrn Prof. Dr. S. MATSUMURA für seine freundliche Anleitungen meinen ergebensten Dank ausdrücken. Ebenfalls danke ich allen Herren, die mir Material zur Verfügung gestellt haben.

BEMERKUNGEN FÜR DEN REKORDER

In der vorliegenden Arbeit werden ausser den neuen Arten folgende Synonyme und Umstellungen, die noch nicht publiziert sind, aufgeführt:

Hylobius abieti MATSUMURA (nec LINNÉ) (1911)
=*H. pinastri karafutonis* n. subsp.

Hylobius perforatus KINOSHITA, YAGI et KAWADA (nec ROELOFS) (1933)

[Jour. Facul. Agr. Hokkaido Imp. Univ., Sapporo, Vol. XXXIII, Pt. 3, Mai, 1934]

=*H. freyi* ZUMPT (1932)

Hylobius transversoguttatus MATSUMURA (nec GOEZ.) (1915)
=*H. freyi* ZUMPT (1932)

Hylobius fatuus KÔNO (nec ROSSI) (1926)=*H. koreanus* n. sp.

Hylobius macilentus MATSUMURA (nec BOHEMAN) (1915)
=*H. desbrochersi* ZUMPT (1932)

Hylobius Gebleri BOHEMAN (1834)=*Poiyaunbus* (n. g.) *gebleri* (BOHEMAN

Hylobius Sedakovi HOCHH. (1851)=*Poiyaunbus* (n. g.) *gebleri* (BOHEMAN

Curculio joponicus HAROLD (1878)=*Poiyaunbus* (n. g.) *gebleri* (BOHEMAN

Hylobius oblongus HUSTACHE (1920)=*Okikuruminus* (n. g.) *oblongus* (HUSTACHE

Curculio Roelofsi HAROLD (1874)=*Okikuruminus* (n. g.) *roelofsi* (HAROLD

Hylobius gibbosus MATSUMURA (1911)
=*Niphades variegatus* (ROELOFS) (1873)

Scaphostetus foveolatus HUSTACHE (1920)
=*Nipponiphades* (n. g.) *foveolatus* (HUSTACHE)

FRASSPFLANZEN

Biologische Studien über die japanischen Arten sind bisher noch seh unzureichend. Mir sind jedoch die folgenden Nährpflanzen bekannt:

Arten:	Frasspflanzen:
Hylobius adachii n. sp.	*Abies* sp.
H. albosparsus BOHEMAN	*Abies sachalinensis*
H. abietis haroldi (FAUST)	*Pinus Thunbergii*
H. pinastri karafutonis n. subsp.	*Abies sachalinensis*
	Pinus pumila
	Picea jezoensis
H. montanus n. sp.	*Abies sachalinensis*
	Pinus pumila
	Picea jezoensis
H. freyi ZUMPT	*Malus pumila* var.
	Obstbäume
H. gigas n. sp.	*Acer* sp.
H. insularis (KÔNO)	*Abies sachalinensis*
H. okinawanus n. sp.	*Cinnamomum camphora*
H. perforatus ROELOFS	*Cinnamomum* sp.
H. desbrochersi ZUMPT	*Cinnamomum* spp.
	Lindera spp.

Poiyaunbus gebleri (BOHEMAN) .... Kraut
Okikuruminus roelofsi (HAROLD) .... Kraut
Niphades variegatus (ROELOFS) .... *Pinus* sp.

KLASSIFIKATION
UNTERFAMILIE *HYLOBIINAE*

Bestimmungstabelle der japanischen Gattungen

1″ Vorderbrust ohne Rüsselfurche .... 2″, 2′
2″ Schulterbeule vorhanden ...... (*Hylobiini*) .... 3″, 3′
3″ Hautflügel normal, nicht degeneriert .... 4″, 4′
4″ Fühlerkeule scheinbar zweigliedrig .... Gattung *Aclees* SCHÖNHERR
4′ Fühlerkeule drei- oder viergliedrig .... 5″, 5′
5″ Rüssel mehr oder weniger gebogen. Das 2te Geisselglied so lang oder ein wenig kürzer als das erste .... 6″, 6′
6″ Stirn viel schmäler als der Rüssel. Schienen an der Innenseite nahe dem basalen ein Drittel verbreitert .... Gattung *Hylobius* GERMAR
6′ Stirn so breit wie die Rüsselmitte. Vier vordere Schienen an der Innenseite in der Mitte verbreitert .... Gattung *Dysceroides* KÔNO
5′ Rüssel fast gerade. Das 2te Geisselglied bedeutend kürzer als das erste .... Gattung *Kobuzo* KÔNO
3′ Hautflügel verkürzt, bedeutend kürzer als die Flügeldecken ... 7″, 7′
7″ Das erste Bauchsegment ohne Haarpinsel. Schulterbeule schwach .... Gattung *Poiyaunbus* n. g.
7′ Das erste Bauchsegment mit 2 Haarpinseln. Schulterbeule kräftig .... Gattung *Okikuruminus* n. g.
2′ Schulterbeule nicht vorhanden ...... (*Liparini*) .... 8″, 8′
8″ Fühlerfurche schräg, zur Basis nach unten gerichtet............... .... Gattung *Euthycus* PASCOE
8′ Fühlerfurche gerade, nicht zur Basis nach unten gerichtet...... .... Gattung *Liparus* OLIVIER
1′ Vorderbrust mit Rüsselfurche ...... (*Lithinini*) .... 9″, 9′
9″ Fühlerschaft nicht länger als der Geissel. Schenkel an der Innenseite mit einem Zahn. Schienen in der Spitzenhälfte gerade, nicht schlank, Endhaken normal .... 10″, 10′
10″ Stirn zwischen den Augen nicht schmäler als der Rüssel. Klauen an der Basis gespalten .... Gattung *Niphades* PASCOE
10′ Stirn zwischen den Augen schmäler als der Rüssel. Klauen ein-

fach, an der Basis nicht gespalten ...... Gattung *Nipponiphades* n. g.

9′ Fühlerschaft länger als der Geissel. Schenkel ohne Zahn. Schienen an der Spitze stark gebogen, schlank, Endhaken sehr kräftig .... Gattung *Himeniphades* n. g.

Gattung **Aclees** SCHÖNHERR

Aclees SCHÖNHERR, Gen. Spec. Curc., III, p. 238 (1836).

Bestimmungstabelle der Arten

1″ Kopf fein punktiert. Halsschild stark gerunzelt. Hinterbrust fein und sehr spärlich punktiert. 15–17 mm. .... *A. taiwanensis* KÔNO

1′ Kopf mässig grob und zerstreut punktiert. Halsschild schwach gerunzelt. Hinterbrust verrunzelt punktiert. 14–15 mm. .... *A. hirayamai* KÔNO

Aclees taiwanensis KÔNO (Taf. V, f. 23, Taf. VI, f. 5)

Aclees taiwanensis KÔNO, Ins. Mats., VII, p. 182 (1933).

Fundort: Formosa (Baibara, 1 ♂, 13/VII. 1927, K. KIKUCHI, Kanshirei, 1 ♂, 14/IV, 1907, Prof. S. MATSUMURA).

J. N.: *Taiwan-nagamezô.*

Aclees hirayamai KÔNO (Taf. V, f. 22)

Aclees hirayamai KÔNO, Ins. Mats., VII, p. 183 (1933).

Fundorte: Okinawa (Ins. Iriomote, 1 ♀, VI. 1932, S. HIRAYAMA); Formosa (Urai, 1 ♂, 1–8/V. 1926, M. KATO).

J. N.: *Hirayama-nagamezô.*

Gattung **Hylobius** GERMAR

Hylobius GERMAR, Mag. Ent., II, p. 340 (1817).
Curculio GEMMINGER et HAROLD, Cat. Col., VIII, p. 2413 (1871).
Hypomolyx J. LEC., Proc. Amer. Philos. Soc., XV, p. 139 (1876).
Pagiophloeus FAUST, Stett. Ent. Zeit., LIII, p. 195, 202 (1892).
Dyscerus FAUST, Stett. Ent. Zeit., LIII, p. 198, 103 (1892).

Bestimmungstabelle der Arten

1″ Zwischenräume der Punktstreifen der Flügeldecken flach, nicht gewölbt .... 2″, 2′

2″ Schenkel nicht gezähnt. Halsschild mit 2 dorsalen Eindrücken. Flügeldecken mit kleinen Haarflecken gleichmässig bestreut ... . 3″, 3′

3″ Das 6te Geisselglied länger als das 5te. Dorsaleindrücke des Halsschildes schwach. Färbung schwarz. 13 mm. ... *H. adachii* n. sp.

3′ Das 6te Geisselglied nur so lang wie das 5te. Dorsaleindrücke des Halsschildes stärker. Färbung rotbraun bis pechbraun. 11–16 mm. .... *H. albosparsus* BOHEMAN

2′ Schenkel deutlich gezähnt. Halsschild gleichmässig gewölbt. Flügeldecken mit Querbinden aus kleinen Haarflecken .... 4″, 4′

4″ Hinterbrust an der Basis mit einer dreieckigen glatten Vertiefung .... 5″, 5′

5″ Dunkel rotbraun bis pechschwarz. Körper mässig plump. 9.5–15 mm. .... *H. abietis haroldi* FAUST

5′ Rotbraun. Körper gestreckt. 9 mm. .... *H. niitakensis* KÔNO

4′ Hinterbrust an der Basis mit einer glatten halbrunden Vertiefung .... 6″, 6′

6″ Schildchen länger als breit. Bauch an den Seiten fleckig dicht gelb behaart. Körper grösser und gestreckter. 9.5–11 mm. ... . *H. montanus* n. sp.

6′ Schildchen breiter als lang. Bauch an den Seiten kaum dichter behaart als in der Mitte. Körper kleiner. 8–9 mm. .... *H. pinastri karafutonis* n. subsp.

1′ Zwischenräume der Punktstreifen der Decken mehr oder weniger gewölbt, der 2te und 4te mindestens an der Basis erhaben ... 7″, 7′

7″ Halsschild an jeder Seite des Mittelkiels längsfurchig vertieft. Flügeldecken grösstenteils dicht behaart, teilweise makelartig kahl .... 8″, 8′

8″ Halsschild so lang wie breit. Schildchen kaum punktiert. 13 mm. .... *H. kanoi* KÔNO

8′ Halsschild breiter als lang. Schildchen mässig dicht punktiert. 11.5–15 mm. .... *H. laeviventris* HUSTACHE

7′ Halsschild ohne Längsfurche. Flügeldecken mindestens im mittleren Drittel spärlich behaart .... 9″, 9′

9″ Talus schwarz beborstet. .... 10″, 10′

10″ Flügeldecken mit 2 Querbinden aus kleinen Haarflecken. Halsschild runzlig skulptiert .... 11″, 11′

11″ Kopf sehr dicht punktiert. Die Zwischenräume der Punktstreifen der Decken weniger glänzend. 15–16 mm. .... *H. shikokuensis* n. sp.

11′ Kopf nicht sehr dicht punktiert. Die Zwischenräume der Punktstreifen der Decken mehr glänzend. 15–16 mm. ...... *H. yakui* n. sp.

10′ Flügeldecken vor der Mitte mit einer Querbinde und hinter dem Absturz der Decken dichter behaart. Halsschild skulptiert mit grossen, halbkreisförmigen und gut von einander geschiedenen Tuberkeln. 13–14 mm. .... *H. galloisi* n. sp.

9′ Talus braun beborstet .... 12″, 12′

12″ Flügeldecken mit 2 Querbinden aus kleinen Haarflecken oder gleichmässig behaart, hinter dem Absturz nicht dicht behaart 13″, 13′

13″ *Flügeldecken mit 2 Querbinden aus kleinen Haarflecken* ...... 14″, 14′

14″ Halsschild verrunzelt tuberkuliert. 8–9 mm. ... *H. cribratus* ROELOFS

14′ Halsschild verrunzelt punktiert. Körper grösser als 11 mm. ... 15″, 15′

15″ Schenkel ohne Zahn. Schildchen liegt mit den Flügeldecken in gleicher Ebene. 11–15 mm. .... *H. freyi* ZUMPT

15′ Schenkel gezähnt. Schildchen erhaben. 12–15 mm. .... *H. koreanus* n. sp.

13′ Flügeldecken ohne Querbinde aus kleinen Haarflecken .... 16″, 16′

16″ Rotbraun. Flügeldecken mit einigen schwarzen Makeln. 6–7.5 mm. .... *H. insularis* (KÔNO)

16′ Dunkelrot bis schwarz. Flügeldecken rotbraun gesäumt. 7–7.5 mm. .... *H. elongatus* ROELOFS

12′ Flügeldecken hinter dem Absturz dichter behaart .... 17″, 17′

17″ Der 2te Zwischenraum der Punktstreifen der Decken ohne Tuberkel .... 18″, 18′

18″ Halsschild verrunzelt punktiert oder verrunzelt tuberkuliert... 19″, 19′

19″ Flügeldecken an der Basis ein wenig dichter beschuppt als in der Mitte, vor der Mitte ohne deutliche Querbinde. 12–16 mm. .... *H. gigas* n. sp.

19′ Flügeldecken vor der Mitte mit einer Querbinde aus anliegenden Borsten .... 20″, 20′

20″ Halsschild an den Seiten kaum abgerundet, auf der Oberseite sehr stark punktiert. 9.5–11.5 mm. .... *H. minowai* KÔNO

20′ Halsschild an den Seiten mässig stark abgerundet, mehr oder weniger verrunzelt tuberkuliert .... 21″, 21′

21″ Färbung rotbraun bis dunkelbraun. Querbinde der Flügeldecken gemeinsam, W-förmig. 15 mm. .... *H. okinawanus* n. sp.

21′ Färbung schwarzbraun bis schwarz. Querbinde der Flügeldecken an der Naht unterbrochen, schräg .... 22″, 22′

22″ Querbinde der Decken weniger dicht beschuppt. Bauch weitläufig punktiert. 14–16 mm. .... *H. orientalis* (MOTSCHULSKY)

22′ Querbinde der Decken dichter beschuppt. Die Punkte auf

den 2 ersten Bauchsegmenten fast erlöschend. 14-15 mm. ...
.... *H. orientalis formosanus* ZUMPT

18′ Halsschild tuberkuliert. Flügeldecken an den Schultern dichter beschuppt .... 23″, 23′

23″ Vorderschenkel des Männchens an der Spitze am Innenrand stumpf zahnartig erweitert. Stirn zwischen den feinen Punkten mit grossen Punkten. 14 mm. ... *H. cribripennis* (MATSUMURA et KÔNO)

23′ Vorderschenkel bei beiden Geschlechtern an der Spitze am Innenrand scharf gezähnt. Scheitel und Stirn fast gleichmässig fein punktiert .... 24″, 24′

″ Skulptur gröber. Körper kräftiger. 12-14 mm. ....
.... *H. perforatus* ROELOFS

24′ Skulptur weniger grob. Körper gestreckter. 13-14.5 mm. ...
.... *H. desbrochersi* ZUMPT

17′ Der 2te und 4te Zwischenraum der Punktstreifen der Flügeldecken mit je 3-5 Pusteln. 15 mm. .... *H. pustulatus* KÔNO

Hylobius adachii n. sp.

Schwarz; Fühler und Tarsen rotbraun. Körper sparsam weiss behaart; Flügeldecken mit zahlreichen, von einander schlecht begrenzten Haarflecken bestreut. Talus braun beborstet.

♂. Kopf quer, sehr dicht punktiert. Stirn in der Mitte mit einem Punktgrübchen. Rüssel kräftig, schwach gebogen, dicht punktiert, an jeder Seite hinter der Mitte mit einer Längsfurche, Fühlergeissel spärlich behaart, die 2 basalen Glieder verkehrt konisch, das erste Glied reichlich 2 mal so lang wie breit, das 2te ein wenig kürzer als das erste, das 3te und 4te so lang wie breit, das 5te quer, am kleinsten, das 6te so lang wie das 4te, das 7te grösser. Keule kräftig, 4-gliedrig, dicht tomentiert. Halsschild ungefähr so lang wie breit, in der Mitte am breitesten, an den Seiten stark abgerundet; Scheibe mit 2 undeutlichen dorsalen Eindrücken, in der Mitte mit einem kurzen Längskiel; die Skulptur besteht aus unregelmässig stark gerunzelter Punktierung, an den Seiten mit halbkreisförmigen Tuberkeln; Augenlappen undeutlich. Schildchen dreieckig, hinten zugespitzt, gewölbt, gleichmässig zerstreut punktiert. Flügeldecken an der Basis deutlich breiter als das Halsschild, hinten bauchig verbreitert, die breiteste Stelle liegt hinter der Mitte; die Skulptur fast wie bei *H. piceus* DEGEER, jedoch die Zwischenräume der Punktstreifen mehr runzlig. Hinterbrust stark runzlig punktiert, an der Basis in der Mitte mit einem Längsgrübchen. Bauch zerstreut, Analsegment etwas dichter punktiert.

Schenkel kaum gezähnt.

Körperlänge: 13 mm (Rüssel excl.)

Das Weibchen ist mir noch unbekannt.

Fundort: Honshu (Chichibu, 1 ♂—Holotypus, 29/VI.–1/VII. 1930, T. Adachi).

J. N.: *Adachi-anaakizô*.

Dem europäischen *H. piceus* Degeer sehr ähnlich, aber Körper kleiner, Fühler und Schildchen anderes gebildet und die dorsalen Eindrücke des Halsschildes schwächer.

Hylobius albosparsus Boheman (Taf. V, f. 11)

Hylobius albosparsus Boheman, Schönh. Gen. Spec. Curc., VIII, 2, p. 429 (1845); Motschulsky, Schrenk. *Reis., II, p. 164, t. 10, f. 17 (1850); Kôno et* Tamanuki, *Dobutsugaku Zasshi*, XXXVIII, p. 290 (1926).

Fundort: Sachalin (Ichinosawa, 1 ♀, 26/VII. 1924, Prof. S. Matsumura, Toyohara, 1 ♀, 29/VII. 1914, Nairo, 1 ♀, 10/VIII. 1914, S. Issiki u. J. Adachi).

Geographische Verbreitung: Sachalin, Sibirien.

J. N.: *Karafuto-anaakizô*.

Hylobius abietis haroldi (Faust) (Taf. VI, f. 9)

Hylobius abietis var. Roelofs, Ann. Soc. Ent. Belg., XVI, p. 187 (1873).

Curculio abietis Lewis, Cat. Col. Jap. Archip., p. 22 (1879).

Curculio (Hylobius) abietis Harold, Deutsch. Ent. Zeitschr., XXII, p. 83 (1878).

Hylobius Haroldi Faust, Deutsch. Ent. Zeitschr., XXVI, p. 273 (1882); *id.*, Hor. Soc. Ent. Ross., p. 3 (1891); Schönfeldt, Cat. Col. Jap., Nachtr. 1, p. 49 (1888); Yokoyama, Zoku Nippon no Konchu, p. 59, *Pl. VIII*, f. 3 (1931); Dalla Torre et Schenkling, Junk Col. Cat., 122, p. 16 (1932).

Hylobius abietis Schönfeldt, Cat. Col. Jap., p. 144 (1887); Matsumura, Konchu Bunruigaku, II, p. 98 (1915); id., Dai Nippon Gaichu Zensho, II, p. 211, Pl. XXII, f. 13 (1915); Okamoto, Ins. Fauna of Quelpart Isl., p. 184 (1924); Dalla Torre et Schenkling, Junk. Col. Cat., 122, p. 7 (1932).

Hylobius haroldi Matsumura, 6000 Illustr. Ins. Jap., p. 285 (1931); id., Illustr. Common Ins. Japan, III, p. 113, Pl. XXVI, f. 13 (1931).

Hylobius abietis haroldi Zumpt, Koleop. Rund., p. 131 (1932).

Fundorte: Honshu (Iwate, 1 ♀, T. Ogasawara, Yonezawa, 1 ♀, 14/V. 1910, Prof. S. Matsumura, Shibata, 1 ♂, Kanazawa, 1 ♂, 10/VI. 1924, S. Takano, Utsunomiya, 1 ♀, 5/VI. 1924, M. Nakamura, Chichibu, 1 ♀, 17/VII. 1913, H. Takabayashi, Shimauchi, 1 ♀, 29/VIII. 1925, H. Kôno, Kioto, 1 ♀, S. Hirayama); Ins. Awaji (Ikuha, 1 ♀, 8/VII. 1930, M. Suzuki); Shikoku (Iyo, 1 ♂, 30/VIII. 1913, S. Arakawa); Kiushu (Kumamoto, 1 ♂, 16/IV. 1907, H. Kawamura); Korea (Taiyudong, 3 ♂ u. 2 ♀, E.

GALLOIS, Shakoji, 1 ♂, 23/VII. 1922, Dr. T. UCHIDA u. S. TAKANO).

Geographische Verbreitung: Japan (Honshu, Shikoku, Kiushu), Korea, Sibirien.

J. N.: *Matsu-anaakizô.*

Hylobius niitakensis KÔNO (Taf. V, f. 18)

Hylobius niitakensis KÔNO, Ins. Mats., VII, p. 184 (1933).

Fundort: Formosa (Hattsukan, 1 ♂, 15/VII. 1927, T. KANO).

J. N.: *Niitaka-anaakizô.*

Hylobius pinastri karafutonis n. subsp. (Taf. V, f. 12)

Hylobius abieti MATSUMURA (nec LINNÉ), Journ. Coll. Agr. Tohoku Imp. Univ., IV, p. 130 (1911).

Das Tierchen unterscheidet sich von der Stammform in den folgenden Punkten:

1. Halsschild dichter und gröber punktiert.
2. Die Punkte in den Punktreihen der Flügeldecken gröber.
3. Shildchen halbkreisförmig.

Körperlänge: 8–9 mm.

Fundorte: Sachalin (Keton, 1 Ex.—Holotypus, 27/VII. 1932, H. KÔNO, Kashiho, 1 Ex., 1/VIII. 1932, H. KÔNO, Horo, 1 Ex., 21/VII. 1932, H. KÔNO, Motodomari, 1 Ex., 16/VIII. 1914, J. ADACHI u. S. ISSIKI, Ichinosawa, 1 Ex., 13/VIII. 1932, Prof. S. MATSUMURA); Hokkaido (Berg Daisetsu, 1 Ex., VIII. 1926, H. KÔNO, Teshio, 1 Ex., 1–4/VII. 1933, K. Igarashi, Berg Oakan, 2 Ex., 10/VII. 1928, H. KÔNO, Berg Meakan, 1 Ex., 8/VII. 1928, H. KÔNO, Shikaribetsu, 1 Ex., 26–29/VII. 1931, C. WATANABE).

J. N.: *Chibi-matsu-anaakizô.*

Hylobius montanus n. sp. (Taf. V, f. 6)

In der roten Färbung, der Punktierung des Körpers sowie auch der halbkreisförmigen Vertiefung der Hinterbrust ist diese Art dem *H. pinastri karafutonis* KÔNO sehr ähnlich, unterscheidet sich aber von dieser durch die folgenden Merkmale:

1. Körper grösser und gestreckter.
2. Rüssel beim Weibchen zwischen der Fühlerbasis mit einer deutlichen Längsfurche.
3. Schildchen länger als breit.
4. Bauch an den Seiten fleckig dicht gelb behaart.

5. *Analsegment beim Männchen in der Mitte deutlich flach niedergedrückt.*

Körperlänge: 9.5-11 mm.

Fundort: Hokkaido (Teshio, 1 ♂, V. 1930, R. SAITO, Sounkei, 1 ♀, 14/VII. 1926, H. KÔNO, Berg Daisetsu, 1 ♂—Holotypus, 22/VII. 1928, Y. MIWA, 1 ♀, 16/VII. 1926, H. KÔNO, Shikaribetsu, 1 ♀, 26/VII. 1931, C. WATANABE, 1 ♀, 9-10/VII. 1931, Dr. S. KUWAYAMA).

J. N.: *Miyama-anaakizô.*

Hylobius kanoi KÔNO (Taf. V, f. 17)

Hylobius kanoi KÔNO, Ins. Mats., VII, p. 184 (1933).

Fundort: Formosa (Taiheizan, 1 ♀, 8/VII. 1926, T. KANO).

J. N.: *Kano-anaakizô.*

Hylobius laeviventris HUSTACHE (Taf. V, f. 2)

Hylobius laeviventris HUSTACHE, Bull. Mus. Paris, p. 497 (1920); DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 16 (1932).

Bei den Exemplaren aus Shikoku ist die Färbung der Bekleidung heller als bei der Stammform.

Fundorte: Honshu (Chichibu, 1 Ex., 17/VII. 1903, H. TAKABAYASHI, Chuzenji, 1 Ex., 22/VII. 1914, 1 Ex., 19/VII. 1917, E. GALLOIS, Sekishi in der Prov. Totomi, 1 Ex., 25/VII. 1913, H. TAKABAYASHI, Nakabusa, 1 Ex., 29/VII. 1924, H. KÔNO); Shikoku (Awa, 4 Ex., 6/VIII. 1913, E. GALLOIS).

J. N.: *Naga-anaakizô.*

Hylobius cribratus ROELOFS

Hylobius cribratus ROELOFS, Ann. Soc. Ent. Belg., XVI, p. 190 (1873); SCHÖNFELDT, Cat. Col. Jap., p. 144 (1887).

Dyscerus cribratus FAUST, Stett. Ent. Zeit., LIII, p. 198 (1892).

Pagiophloeus cribratus DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 22 (1932).

Fundorte: Honshu (Abiko, 1 ♂, S. HIRAYAMA); Shikoku (Awa, 1 ♂, 6/VIII. 1913, E. GALLOIS).

J. N.: *Ko-kuro-anaakizô.*

Hylobius freyi ZUMPT (Taf. V, f. 3, Taf. VI, f. 10)

Hylobius transversoguttatus MATSUMURA (nec GOEZ.), Dainippon Gaichu Zensho, II, p. 212, Pl. XXIII. f. 1 (1915).

Hylobius perforatus KINOSHITA, YAGI et KAWADA (nec ROELOFS), Biographia Insectorum, II, Pl. 161 (1933).

Hylobius freyi ZUMPT, Koleop. Rundsch., 28, p. 128 (1932).

Wie schon ZUMPT (l. c.) bemerkt, variieren die sekundären geschlechtsdimorphen Merkmale wie der Abdominaleindruck und die Länge und Skulptur des Rüssels, so dass es zuweilen schwer fällt, auf deren Ausbildung hin das Geschlecht mit Sicherheit festzustellen.

Fundorte: Hokkaido (Berg Teine, 1 ♂, 3/VI. 1928, H. KÔNO); Honshu (Yonezawa, 1 ♀, 17/V. 1916, Prof. S. MATSUMURA, Kanazawa, 1 ♂, 10/VI. 1924, S. TAKANO, Gumma, 1 ♂, 25/V. 1913, Prof. S. MATSUMURA, Shimauchi, 1 ♂, 24/VII. 1924, H. KÔNO, Kioto, 1 ♂ u. 1 ♀, 27/V. 1927, K. TAKEUCHI, Tokio, 1 ♀, 19/V. 1912, H. TAKABAYASHI, Omiya, 1 ♀, 13/VII. 1913, E. GALLOIS); Shikoku (Awa, 1 ♀, 3/VIII. 1913, E. GALLOIS).

J. N.: *Frey-anaakizô.*

Hylobius koreanus n. sp.

Hylobius fatuus KÔNO (nec ROSSI), Trans. Nat. Hist. Soc. Formosa, XVI, p. 89 (1926).

Schwarz; Fühler und Tarsen dunkel rotbraun. Behaarung und Zeichnung wie bei *H. freyi* ZUMPT.

Kopf unregelmässig grob punktiert; Stirngrübchen undeutlich. Rüssel leicht gebogen, verrunzelt punktiert, in den basalen 2 Dritteln mit 6 Längsfurchen, welche gereiht grob punktiert sind, zwischen den Fühlereinlenkungen mit einer Längsfurche. Fühlerfurche verläuft hin schräg zum Unterrand des Auges. Die 2 basalen Geisselglieder bedeutend länger als breit, das 2te etwas kürzer als das erste, das 4te kaum kürzer als das 3te, die übrigen quer. Halsschild breiter als lang, an den Seiten mässig stark abgerundet, nach vorn etwas stärker verengt als nach hinten, grob und stark verrunzelt punktiert, in der Mitte mit einem schwachen Mittelkiel, Augenlappen schwach entwickelt. Schildchen glänzend, erhöht, hinten abgerundet. Flügeldecken viel breiter als das Halsschild, mit kräftigen Schultern, am Ende gemeinsam abgerundet; die Punktierung und Zeichnung ganz wie bei *H. freyi* ZUMPT. Unterseite spärlich punktiert; Analsegment grob und unregelmässig ziemlich dicht punktiert. Alle Schenkel kräftig gekeult und fein gezähnt. Vorderschiene an der Innenecke der Spitze beim Weibchen mit einem scharfen Zahn, beim Männchen zahnartig erweitert. Talus rotbraun beborstet. Geschlechtsmerkmale wie bei *H. freyi.*

Körperlänge: 12–15 mm.

In der Körperform, Grösse, Skulptur und Zeichnung ist diese Art dem *H. freyi* ZUMPT täuschend ähnlich, unterscheidet sich jedoch durch das mehr gewölbte Schildchen und die fein gezähnten Schenkel.

Fundort: Korea (Suigen, 1 ♂—Holotypus u. 1 ♀—Allotypus, 25/V. 1928, S. SATO, 1 ♂, 1/VI. 1919, E. GALLOIS, 1 ♀, Shakoji, S. TAKANO u.

T. UCHIDA).

J. N.: *Chosen-anaakizô.*

Hylobius shikokuensis n. sp. (Taf. V, f. 5)

Ist in der Körperform sowie auch in der Zeichnung der vorhergehenden Art sehr ähnlich, aber in den folgenden Punkten verschieden:

1. Rüssel an der Spitze in der Mitte breit niedergedrückt, von der Seite gesehen vor der Fühlereinlenkung schräg abfallend.
2. Fühlerkeule länger.
3. Punktierung des Kopfes etwas schwächer.
4. Halsschild unregelmässig grob gerunzelt punktiert, an den Seiten mit halbkreisförmigen Tuberkeln.
5. Schildchen dreieckig, dicht punktiert und fein behaart, nicht prominent.
6. Flügeldecken am Ende einzeln kurz zugespitzt; die Punktierung gröber.
7. Metasternum grob und runzlig punktiert.
8. Talus der Schienen schwarzbraun bis schwarz beborstet.

Körperlänge: 15–16 mm.

Fundort: Shikoku (Awa, 1 ♂—Holotypus u. 1 ♀—Allotypus, 9/VIII. 1913, E. GALLOIS).

J. N.: *Shikoku-anaakizô.*

Hylobius yakui n. sp. (Taf. V, f. 8, Taf. VI, f. 11)

Dem *H. shikokuensis* KÔNO nahe verwandt.

Glänzend schwarz; Fühler und Tarsen dunkel braun. Ganze Ober- und Unterseite weitläufig weiss behaart, auf den Flügeldecken mit 2 gelben Querbinden, welche aus mehreren kleinen Haarmakeln besteht und viel schmäler sind als bei *H. freyi* ZUMPT. Talus schwarz beborstet.

Kopf nicht dicht punktiert; Stirn in der Mitte zwischen den Augen mit einem Punktgrübchen. Rüssel schwach gebogen, an der Spitze abfallend, zwischen den Fühlereinlenkungen breit niedergedrückt, beim Weibchen auf der Oberseite ziemlich dicht punktiert, ohne Längskiel, an der Basis seitlich grob und dicht punktiert, beim Männchen fast wie bei *H. freyi.* Das 2te Geisselglied ein wenig kürzer als das erste, die übrigen rundlich. Keule länger als bei *H. freyi.* Halsschild wie bei *H. shikokuensis* runzlig skulptiert und an den Seiten tuberkuliert, Augenlappen undeutlich. Schildchen dreieckig, gleichmässig fein behaart. Flügeldecken am Ende einzeln zugespitzt; die Skulptur weniger grob und die Zwischen-

räume glänzender als bei *H. shikokuensis*, die Zwischenräume spärlich fein punktiert und mit abgeflachter Körnerung, der 3te Zwischenraum etwas erhabener als die anderen, jede Deck am Absturz zwischen den 3ten und 8ten Streifen mit einer breiten Schwiele. Metasternum grob und runzlig punktiert, an der Basis mit einer tiefen Mittelfurche. Bauch weitläufig punktiert, das erste und 2te Bauchsegment beim Männchen in der Mitte breit vertieft, beim Weibchen am Hinterrand in der Mitte dreieckig niedergedrückt. Alle Schenkel stark gekeult und fein gezähnt. Vorderschiene an der Innenecke der Spitze beim Weibchen zahnartig, beim Männchen stumpf erweitert.

Körperlänge: 15–16 mm.

Fundorte: Hokkaido (Sapporo, 1 ♀—Allotypus, 2/VI. 1932, H. YAKU, 1 ♀, 2/VI. 1930, Y. MIWA, 1 ♂—Holotypus, Prof. S. MATSUMURA); Honshu (Minomo, 1 ♂, 30/V. 1915, K. TAKEUCHI, Ikaho, 1 ♀, VIII. 1927, Prof. S. MATSUMURA).

J. N.: *Yaku-anaakizô*.

Hylobius galloisi n. sp. (Taf. V, f. 4)

Schwarz; Fühler und Tarsen dunkel braun. Behaarung braun, über die ganze Ober- und Unterseite weitläufig stehend und auf den Flügeldecken 2 undeutliche breite Querbinden bildend; Flügeldecken hinter dem Absturz dichter behaart. Talus schwarz beborstet.

Kopf fein und dicht punktiert; Stirn zwischen den Augen mit einem tiefen Grübchen. Rüssel schwach gebogen, verrunzelt punktiert, von der Seite gesehen vor der Fühlereinlenkung schräg abfallend, in den basalen 2 Dritteln mit 6 Längsfurchen, Mittelkiel mehr oder weniger scharf, zwischen den Fühlereinlenkungen schmal dreieckig vertieft. Die 2 basalen Geisselglieder sind fast gleich lang, bedeutend länger als breit, das 3te kaum länger als breit, das 4te, 5te und 6te fast so lang wie breit, das 7te ein wenig breiter als lang, an den Seiten stark abgerundet, nach vorn etwas stärker verengt als nach hinten, die breiteste Stelle liegt in der Mitte, die Skulptur besteht aus grossen, halbkugelförmigen Tuberkeln, die von einander gut geschieden sind, in der Mitte der vorderen Hälfte mit einem Längskiel, Augenlappen stark entwickelt. Schildchen dreieckig, gleichmässig fein punktiert. Flügeldecken breiter als das Halsschild, am Ende einzeln zugespitzt, Schulterbeule kräftig; die Punkte in den Punktstreifen grob, tiefer und gröber als bei *H. freyi* ZUMPT, die Zwischenräume mit Körnchen besetzt, der 3te und 5te Zwischenraum erhabener als die anderen, der 5te am Absturz mit einer kräftigen Schwiele. Metasternum

dicht grob punktiert, die dreieckige Vertiefung am Hinterrand glatt. Bauch weitläufig punktiert, an den Seiten ebenso wie das Analsegment ganz verrunzelt grob punktiert. Das erste und 2te Bauchsegment bei beiden Geschlechtern in der Mitte mehr oder weniger vertieft, beim Männchen etwas stärker als beim Weibchen. Alle Schenkel stark gekeult und fein gezähnt. Vorderschiene an der Innenecke der Spitze bei beiden Geschlechtern zahnartig erweitert.

Körperlänge: 13–14 mm.

Diese Art gehört zur *H. shikokuensis*-Gruppe, ist aber durch die Zeichnung und Skulptur ausgezeichnet.

Fundorte: Hokkaido (Sapporo, 1 ♂, Dr. S. MATSUMURA, 1 ♂, Y. MIWA, 1 ♀, 9/VI. 1928, H. KÔNO); Honshu (Yonezawa, 1 ♀, Chuzenji 1 ♂ — Holotypus u. 1 ♀—Allotypus, 29/VII. 1915, 10 Ex., 10/VII.–7/VIII. 1926, 2 ♀, 18/VII. 1917, E. GALLOIS).

J. N.: *Gallois-anaakizô.*

Hylobius gigas n. sp. (Taf. V, f. 1)

Schwarz; Fühler und Tarsen dunkel braun. Behaarung gelb, sparsam, auf den Flügeldecken an der Basis und hinter dem Absturz dichter gestellt.

Kopf grob und sehr dicht verrunzelt punktiert, Stirn zwischen den Augen mit einem tiefen Grübchen. Rüssel kräftig, schwach gebogen, an der Spitze abfallend, zwischen den Fühlerbasis mit einer länglichen Vertiefung, die Punktierung ziemlich dicht, verrunzelt, an der Rüsselbasis nur mit seitlichen Streifen. Das 2te Geisselglied ein wenig kürzer als das erste, das 3te viel kürzer als das 2te, kaum länger als breit, die folgenden Glieder an der Länge mehr abnehmend. Keule länger als bei *H. freyi* ZUMPT. Halsschild ein wenig breiter als lang, an den Seiten mässig stark abgerundet, an der Basis zweibuchtig; Augenlappen deutlich entwickelt, aber etwas schwächer als bei *H. galloisi* KÔNO; die Skulptur besteht aus verrunzelten Tuberkeln, am Vorderrand spärlich punktiert. Schildchen länger als breit, hinten abgerundet, die Punktierung unregelmässig. Flügeldecken viel breiter als das Halsschild, an jeder Seite hinter der Schulterbeule mit einer deutlichen Beule, am Ende beim Männchen abgerundet, beim Weibchen kurz zugespitzt; die Punktierung etwas schwächer als bei *H. galloisi*, die Zwischenräume grob gekörnt, der 3te und 5te Zwischenraum erhabener als die anderen, der 5te am Ende stark geschwielt. Metasternum verrunzelt grob punktiert, an der Basis mit einer dreieckigen Vertiefung. Bauch weitläufig punktiert, Analsegment dicht grob punktiert (stärker beim

Männchen). Das erste Bauchsegment beim Männchen schwach vertieft. Alle Schenkel stark gekeult und fein gezähnt.

Körperlänge: 12–16 mm.

Diese Art gehört zur *H. freyi*-Gruppe, ist aber durch die Körperform, Zeichnung sowie auch durch die Skulptur leicht kenntlich.

Fundort: Hokkaido (Jôzonkei, 1 ♂—Holotypus, 18/VIII. 1925, Dr. T. UCHIDA u. K. TAMANUKI, Berg Eniwa, 1 ♀—Allotypus, 15/VI. 1929, H. KÔNO).

J. N.: *Futo-anaakizô.*

Hylobius elongatus ROELOFS

Hylobius elongatus ROELOFS, Ann. Soc. Ent. Belg., XVI, p. 190 (1873); i. d., l. c., XXIV, p. 17 (1880); SCHÖNFELDT, Cat. Col. Jap., p. 144 (1887).

Curculio elongatus LEWIS, Cat. Col. Jap. Archip., p. 22 (1879).

Dyscerus elongatus FAUST, Stett. Ent. Zeit., LIII, p. 198 (1892).

Pagiophloeus elongatus DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 21 (1932).

Fundort: Honshu (Iwate, 1 ♀, T. OGASAWARA, Konodai, 1 ♂, 2/VII. 1912, H. TAKABAYASHI, Berg Takao, 1 ♀, 5/V. 1914, E. GALLOIS, Kioto, 1 ♂, 24/IV. 1925, K. TAKEUCHI).

J. N.: *Hoso-anaakizô.*

Hylobius insularis (KÔNO)

Dyscerus insularis KÔNO, Ins. Mats., II, p. 168, t. 6, f. 17 (1928).

Pagiophloeus insularis DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 21 (1932).

Fundort: Hokkaido (Nopporo, 1 ♂, 10/VI. 1928, 1 ♀, 1/VI. 1924, H. KÔNO).

J. N.: *Todomatsu-anaakizô.*

Hylobius okinawanus n. sp.

Färbung rotbraun bis dunkelbraun. Behaarung braun, sparsam; Flügeldecken im ersten Drittel mit einer W-förmigen, gemeinsamen Haarbinde, ebenso die Zwischenräume der Streifen hinter dem Absturz dichter behaart, Talus braun beborstet.

Kopf mässig stark, Stirn gröber punktiert; Stirn in der Mitte mit einem schwachen Eindruck. Rüssel fast so lang wie Kopf und Halsschild zusammen, stark verrunzelt punktiert, beim ♂ in der Mitte mit einem undeutlichen Längskiel, bei beiden Geschlechtern an jeder Seite mit je 2 schwachen Längsfurchen. Das erste Geisselglied zweimal so lang wie breit, das 2te etwas kürzer als das erste, das 3te ungefähr so lang wie breit, das 4te noch etwas kürzer, das 5te und 6te quer, das 7te so lang wie das 4te;

Keule oval, das Spitzenglied schwach zugespitzt. Halsschild breiter als lang, an den Seiten stark abgerundet; auf der Oberseite stark verrunzelt punktiert, dazwischen zerstreut mit schwielenförmigen oder höckerigen Tuberkeln, an den Seiten höckerartig tuberkuliert, in der Vorderhälfte in der Mitte mit einem Längskiel; Augenlappen kräftig entwickelt. Schildchen klein, so lang wie breit, fein punktiert und behaart. Flügeldecken breiter als das Halsschild, ungefähr doppelt so lang wie breit, an der Spitze einzeln zugespitzt, Schultern kräftig; die Skulptur fast wie bei *H. orientalis* MOTSCHULSKY, aber die Punkte in den Streifen kräftiger und tiefer, die Zwischenräume also anscheinend schmäler und gewölbter, der 4te Zwischenraum am Ende schwielenartig verdickt. Unterseite weitläufig punktiert, das erste Bauchsegment beim ♂ mit einem Längseindruck. Schenkel stark gekeult und kräftig gezähnt.

Körperlänge: 15 mm.

Fundort: Okinawa (1 ♂—Holotypus u. 1 ♀—Allotypus, X, 1908, Prof. Dr. S. MATSUMURA).

J. N.: *Okinawa-anaakizô.*

Dem *H. orientalis* MOTSCHULSKY nahe verwandt, aber durch die Punktierung, Zeichnung, sowie auch die Skulptur leicht kenntlich.

Hylobius exsculptus ROELOFS

Hylobius exsculptus ROELOFS, Compt. rend. Soc. Ent. Belg., XVIII, p. cxxx (1875); SCHÖNFELDT, Cat. Col. Jap., p. 144 (1887); DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 15 (1932).

Curculio exsculpatus LEWIS, *Cat. Col. Jap. Archip., p. 22 (1879).*

Fundort: Honshu (Kioto und Hiogo, nach ROELOFS).

Geographische Verbreitung: Japan (Honshu), China.

Hylobius minowai KÔNO (Taf. V, f. 21)

Hylobius minowai KÔNO, Ins. Mats., VII, p. 185 (1933).

Fundort: Formosa (*Nishimura-Kobayashi, 1 ♂ u. 1 ♀, 25/VII. 1929*, S. MINOWA u. C. WATANABE, Ibaho, 1 ♂, 10/VII. 1925, H. KÔNO, Kyuhabon, 1 ♂, 5/VIII. 1926, K. KIKUCHI).

J. N.: *Minowa-anaakizô.*

Hylobius orientalis (MOTSCHULSKY)

Heilipus orientalis MOTSCHULSKY, Bull. Mosc., XXXIX, p. 180 (1866); SCHÖNFELDT, Cat. Col. Jap., p. 145 (1887).

Hylobius perforatus ROELOFS, Ann. Soc. Ent. Belg., p. 188 (1873).

Aclees hylobioides DESBROCHERS, Ann. Soc. Ent. Belg., XXXV, Compt. rend., p. ccclii (1891).

Pagiophloeus hylobioides FAUST, Stett. Ent. Zeit., LX, p. 359 (1894).

Pagiophloeus orientalis DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 22 (1932).
Hylobius orientalis ZUMPT, Koleop. Rundsch., 18, pp. 130–134 (1932).

Fundort: Kiushu (Nagasaki, nach ROELOFS).

Geographische Verbreitung: Japan (Kiushu), China.

J. N.: *Shiroobi-anaakizô.*

Hylobius orientalis formosanus ZUMPT (Taf. V, f. 15)

Hylobius orientalis formosanus ZUMPT, Koleop. Rundsch., 18, p. 134 (1932); KÔNO, Ins. Mats., VII, p. 186 (1933).

Fundort: Formosa (Funkiko, 1 ♂, 10/VIII. 1925, M. KATÔ, Karenko, 1 ♀, 19/VII.–20/VIII., T. OKUNI u. J. SONAN, Berg Arisan, 1 ♂, Prof. S. MATSUMURA).

Hylobius cribripennis (MATSUMURA et KÔNO)

Dyscerus cribripennis MATSUMURA et KÔNO, Ins. Mats., II, p. 168, t. VI, f. 18 (1928).
Pagiophloeus cribripennis DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 21 (1932).

Fundort: Honshu (Ins. Hachijo, 1 ♂, 20/V. 1909, Prof. S. MATSUMURA).

J. N.: *Ojiro-anaakizô.*

Hylobius perforatus ROELOFS (Taf. V, f. 16)

Hylobius perforatus ROELOFS, Ann. Soc. Ent. Belg., XVI, p. 188 (1873); SCHÖNFELDT, Cat. Col. Jap., p. 145 (1887); MATSUMURA, Thous. Ins. Jap., VI, p. 1, Pl. LVI, f. 2 (1906); id., 6000 Illustr. Ins. Jap., p. 285 (1931); YUASA, Nippon Konchu Zukan, p. 541 (1932); YOKOYAMA, Zoku Nippon no Kôchu, p. 61, Pl. VIII, f. 9 (1931); DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 17 (1932); KAMIYA et ADACHI, Genshoku Kôchu Zufu, Pl. 43, f. 10 (1933); KÔNO, Ins. Mats., VII, p. 186 (1933).
Curculio perforatus HAROLD, Deutsch. Ent. Zeitschr., XXII, p. 84 (1878); LEWIS, Cat. Col. Jap. Archip., p. 22 (1879).

Fundorte: Kiushu (Nagasaki, nach HAROLD); Riukiu (Ins. Iriomote, 1 ♂, V. 1932, S. HIRAYAMA); Formosa (Shinchiku, 1 ♂, 18/VII. 1930, J. SONAN).

Geographische Verbreitung: Japan (Kiushu, Riukiu), Formosa, China.

J. N.: *Kusu-anaakizô.*

Hylobius desbrochersi ZUMPT (Taf. V, f. 7)

Aclees Roelofsi DESBROCHERS, Ann. Soc. Ent. Belg., XXXV, Compt. rend., p. cccli (1891).
Pagiophloeus Roelofsi FAUST, Stett. Ent. Zeit., LIII, p. 50 (1892).
Hylobius macilentus MATSUMURA (nec BOHEMAN), Dainippon Gaichu Zensho, I.L., p. 222, Pl. XXVIII, f. 3 (1915).
Hylobius desbrochersi ZUMPT, Koleop. Rundsch., 18, p. 130 (1932).

Fundorte: Honshu (Berg Takao, 2 ♀, 27/V. 1917, E. GALLOIS, Tokio, 1 ♂ u. 1 ♀, V. 1912, Prof. S. MATSUMURA); Shikoku (Berg Kodakasa in

der Prov. Tosa 1 ♀, 28/VI. 1930, Y. SUGIHARA).
J. N.: *Toge-anaakizô.*

Hylobius pustulatus KÔNO (Taf. V, f. 25)

Hylobius pustulatus KÔNO, Ins. Mats., VII, p. 186 (1933).

Fundort: Formosa (Musha, 1 ♀, 24/V. 1927, K. KAMIYA).
J. N.: *Kobu-anaakizô.*

Gattung ***Dysceroides*** KÔNO

Dysceroides KÔNO, Ins. Mats., VII, p. 187 (1933).

Dysceroides bipustulatus KÔNO (Taf. V, f. 19, Taf. VI, f. 2, 7, 13)

Dysceroides bipustulatus KÔNO, Ins. Mats., VII, p. 187 (1933).

Fundort: Formosa (Urai, 1 ♂, 5/VII. 1924, H. KÔNO).
J. N.: *Kuroobi-anaakizô.*

Gattung ***Kobuzo*** KÔNO

Kobuzo KÔNO, Ins. Mats., VII, p. 183 (1933).

Bestimmungstabelle der Arten

1″ Schwarz; Flügeldecken tief rot, ein Querband in der Mitte verdunkelt. Flügeldecken auf dem 2ten, 4ten, 6ten und 7ten Zwischenraum mit je 2–3 grösseren Tuberkeln, der 4te am Ende mit einem grossen, dornartigen Höcker. 11.5 mm. ...... *K. kikuchii* KÔNO

1′ Rotbraun; Flügeldecken mit einem schwarzen Querband. Flügeldecken auf den Zwischenräume der Streifen einreihig granuliert, der Höcker am Ende des 4ten Zwischenraums rechtwinklig. 8.5 mm. .... *K. rectirostris* ROELOFS

Kobuzo rectirostris (ROELOFS) (Taf. V, f. 10, Taf. VI, f. 6)

Hylobius rectirostris ROELOFS, Ann. Soc. Ent. Belg., XVI. p. 188 (1873); SCHÖNFELDT, Cat. Col. Jap., p. 145 (1887), DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 19 (1932).

Curculio rectirostris LEWIS, Cat. Col. Jap. Aachip., p. 22 (1879).

Kobuzo rectirostris KÔNO, Ins. Mats., VII, p. 188 (1933).

Fundort: Honshu (Yamanaka in der Prov. Kaga, 1 Ex., 19/VII. 1910, T. OTSUKA).
J. N.: *Aka-kobukobuzô.*

Kobuzo kikuchii KÔNO (Taf. V, f. 24, Taf. VI, f. 1)

Kobuzo kikuchii KÔNO, Ins. Mats., VII, p. 188 (1933).

Fundort: Formosa (Kyuhabon, 1 ♀, 5/VIII. 1926, K. KIKUCHI).
J. N.: *Kikuchi-kobukobuzô.*

Gattung *Poiyaunbus* n. g.

Der Gattung *Hylobius*, besonders der *abictis*-Gruppe nahe verwandt, Hautflügel aber degeneriert.

Stirn zwischen den Augen deutlich schmäler als die Rüsselbasis. Rüssel mässig gebogen. Fühlerschaft nicht erreicht den Vorderrand des Halsschildes, das 7te Geisselglied nicht tomentiert. Mandibel zweispitzig. Flügeldecken an den Schultern abgerundet, die Zwischenräume der Punktstreifen flach. Hautflügel degeneriert, viel kürzer als die Decken. Metasternum am Hinterrand in der Mitte dreieckig vertieft. Alle Schenkel mässig stark gekeult und gezähnt.

Genotypus: *Hylobius Gebleri* BOHEMAN (1834).

Poiyaunbus gebleri (BOHEMAN) (Taf. V, f. 9)

Hylobius Gebleri BOHEMAN, Schönh. Gen. Spec. Curc., II, p. 338 (1834); l. c., VI, 2, p. 338 (1842); ROELOFS, Compt. rend. Soc. Ent. Belg., XVIII, p. cxxx (1875); FAUST, Deutsch. Ent. Zeitschr., XXVI, p. 274 (1882); SCHÖNFELDT, Cat. Col. Jap., p. 145 (1887); DALLA TORRE et SCHENKLING, Junk. Col. Cat., 122, p. 15 (1932).

Curculio Gebleri LEWIS, Cat. Col. Jap., Archip., p. 22 (1879).

Lepyrus signatipennis ROELOFS, Compt. rend. Soc. Ent. Belg., XVIII, p. cxxx (1875).

Hylobius signatipennis ROELOFS, Compt. rend. Soc. Ent. Belg., XVIII, p. cxxx (1875).

Curculio japonicus HAROLD, Deutsch. Ent. Zeitschr., XXII, p. 83 (1878); LEWIS, Cat. Col. Jap. Archip., p. 22 (1879).

Hylobius gebleri MATSUMURA, Illustr. Common Ins. Jap., III, pp. 113, 163, Pl. XXVI, f. 12 (1931).

Rüssel beim Männchen mitunter in den basalen 2 Dritteln mit einem Mittelkiel, in der Regel aber ohne solchen. Fühler gewöhnlich rot mit schwarzer Keule, selten einfarbig schwarz.

H. sedakovi HOCHH. (Bull. Mosc., p. 37, 1851) aus Südost-Sibirien ist höchst wahrscheinlich mit dieser Art identisch.

Fundorte: Ins. Rishiri (Berg Rishiri, 1 ♀, VI. 1899, T. KAWAKAMI, 2 ♂, 25/VII. 1924, K. DOI); Hokkaido (Chitose, 2 ♀, Prof. S. MATSUMURA, Jozankei, 1 ♀, 8/VII. 1907, 1 ♂ u. 1 ♀, 1/VII. 1912, 1 ♀, IX, 1914, Prof. S. MATSUMURA, 1 ♀, 14/V. 1914, Dr. S. ISSIKI, Sounkei, 1 ♀, 4/VII. 1927, H. KÔNO, Berg Daisetsu, 1 ♂ u. 1 ♀, 15/VII. 1925, H. KÔNO, Aoyama, 1 ♂ u. 1 ♀, 8/VI. 1924, H. KÔNO); Honshu (Tanigumi in der Prov. Mino, 1 ♀, 8/IV. 1930, M. SUZUKI).

Geographische Verbreitung: Japan (Hokkaido, Honshu), Sibirien.

J. N.: *Kuro-anaakizô*.

Gattung *Okikuruminus* n. g.

Der Gattung *Hylobius*, besonders der *Pagiophloeus*-Gruppe nahe verwandt.

Kopf- und Rüsselbildung wie bei der *Pagiophloeus*-Gruppe. Das 7te Geisselglied wie die Keule tomentiert. Flügeldecken am Ende einzeln zugespitzt, die breiteste Stelle liegt in oder nahe der Mitte; das 2te und 3te Spatium längsschwielenartig gewölbt. Hautflügel degeneriert, viel kürzer als die Flügeldecken, Schulterbeule der Decken aber nicht degeneriert. Metasternum am Hinterrand dreieckig vertieft. Das erste Bauchsegment hinter den Hinterschenkeln mit je einem langen Borstenpinsel. Analsegment hinter der Mitte mit 2 Borstenbüscheln. Alle Schenkel mässig stark gekeult und fein gezähnt. Schienen fast gerade, an den Spitzen gekrümmt.

Genotypus: *Curculio Roelofsi* HAROLD (1874).

Bestimmungstabelle der Arten

1″ Bekleidung der Oberseite braun. Beine grösstenteils rotbraun. *10–12 mm.* .... *O. oblongus* (HUSTACHE)

1′ Bekleidung der Oberseite weisslich braun bis braun. Beine schwarz.

2″ Halsschild so lang wie breit, selten ein wenig kürzer als breit, an den Seiten mässig stark abgerundet. 11–15 mm. .... *O. roelofsi* (HAROLD)

2′ Halsschild deutlich breiter als lang, an den Seiten stark abgerundet. *13–15 mm.* .... *O. roelofsi sachalinensis* n. subsp.

Okikuruminus oblongus (HUSTACHE) (Taf. V, f. 14)

Hylobius oblongus HUSTACHE, Bull. Mus. Paris, p. 496 (1920); DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 16 (1932).

Fundort: Honshu (Nikko, 1 Ex., VIII. 1912, 1 Ex., 8/VII. 1913, Prof. S. MATSUMURA, Chuzenji, 1 Ex., 26/VII. 1916, 1 Ex., 29/VII. 1917, E. GALLOIS, Berg Togakushi, 1 Ex., 23/VIII. 1910, T. OTSUKA, Berg Hakuba, 1 Ex., 18/VIII. 1917, K. TAKEUCHI).

J. N.: *Miyama-tamagozô.*

Okikuruminus roelofsi (HAROLD) (Taf. V, f. 13)

Curculio Roelofsi HAROLD, Deutsch, Ent. Zeitschr., XXII, p. 84 (1878); LEWIS, Cat. Col. Jap. Archip., p. 22 (1879).

Hylobius Roelofsi SCHÖNFELDT, Cat. Col. Jap., p. 145 (1887); DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 19 (1932).

Pagiophloeus Roelofsi DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 22 (1932).

Fundorte: Hokkaido (Berg Daisetsu, 2 Ex., 14/VII. 1926, H. KÔNO, Teshio, 1 Ex., 9/VI. 1920, Dr. J. SHIBUYA, 1 Ex., 6/VII. 1916, Dr. S. ISSIKI, 1 Ex., 1–4/VII. 1930, K. IGARASHI, Berg Teine, 2 Ex., 21/VI.

1926, H. KÔNO, Aoyama, 3 Ex., 8/VI. 1924, H. KÔNO, Sapporo, 1 Ex., 19/VIII. 1911, Dr. S. MATSUMURA, 1 Ex., 2/VI. 1932, K. IGARASHI, 1 Ex., 20/VI. 1925, 1 Ex., 2/VI. 1932, H. KÔNO); Ins. Rishiri (1 Ex., 28/VII. 1924, K. DOI).

J. N.: *Kita-tamagozô.*

Okikuruminus roelofsi sachalinensis n. subsp.

Halsschild kürzer und breiter als bei der Stammform, Flügeldecken bei beiden Geschlechtern der Länge nach stärker gewölbt.

Körperlänge: 13–15 mm.

Fundorte: Sachalin (Konuma, 2 Ex., 7/V. 1927, K. TAMANUKI, Tonnai, 7 Ex., 1927, Dr. Y. MIWA u. S. MINOWA, Ichinosawa, 1 Ex., VIII. 1923, Prof. S. MATSUMURA); Kurilen (Ins. Kunashiri, 1 Ex., 14/VII. 1925, K. DOI).

Tribus ***Liparini***

Subtribus ***Liparina***

Gattung ***Liparus*** OLIVIER

Liparus OLIVIER, Ent. V, p. 73 (1807).
Molytes SCHÖNHERR, Curc. disp. meth., p. 1172 (1826); Gen. Curc., II, p. 349 (1834).

Liparus lewisi (ROELOFS)

Molytes Lewisi ROELOFS, Ann. Soc. Ent. Belg., XVI, p. 178 (1873); LEWIS, Cat. Col. Jap. Archip., p. 21 (1879); SCHÖNFELDT, Cat. Col. Jap., p. 143 (1887).
Liparus Lewisi DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 55 (1932).

Fundort: Honshu (Hiogo, nach ROELOFS).

Subtribus ***Liosomatina***

Gattung ***Euthycus*** PASCOE

Euthycus PASCOE, Ann. Mus. Genova, (2), II, p. 220 (1885).
Euthicus HELLER, Deutsch. Ent. Zeitschr., p. 10 (1922).

Bestimmungstabelle der Arten

1″ Die Punkte in den Punktstreifen der Flügeldecken stichelförmig. Das 3te Spatium vor dem Deckenabsturz ohne Längshöcker. 11 mm. .... *E. japonicus* HELLER

1′ Die Punkte in den Punktstreifen der Flügeldecken länglich oval. Das 3te Spatium vor dem Deckenabsturz mit einem länglichen Längshöcker. 8 mm. .... *E. excisus* HELLER

Euthycus excisus HELLER

Euthicus excisus HELLER, Wien. Ent. Zeit., 48, p. 100 (1931).
Euthycus excisus DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 66 (1932).

Fundort: Formosa (Suisharyo, nach HELLER).

J. N.: *Atokubu-ikarizô.*

Euthycus japonicus HELLER

Euthicus japonicus HELLER, Deutsch. Ent. Zeitschr., pp. 11, 12 (1922); id., Wien. Ent. Zeit., 48, p. 100 (1931).
Euthycus japonicus DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 66 (1932).

Fundort: Japan (nach HELLER).

J. N.: *O-ikarizô.*

Tribus **Lithinini**

Gattung **Niphades** PASCOE

Niphades PASCOE, Journ. Linn. Soc. Lond., XI, p. 174 (1871).
Scaphostethus ROELOFS, Ann. Soc. Ent. Belg., XVI, p. 191 (1873); FAUST, Hor. Soc. Ent. Ross., XX ,p. 172 (1886).

Niphades variegatus (ROELOFS) (Taf. V, f. 20, Taf. VI, f. 12)

Scaphostethus variegatus ROELOFS, Ann. Soc. Ent. Belg., XVI, p. 192, Pl. 3, f. 12 (1873); FAUST, Hor. Soc. Ent. Ross., XXIV, p. 469 (1890).
Hylobius gibbosus MATSUMURA, Journ. Coll. Agr. Sapporo, IV, p. 130 (1911), DALLA TORRE et SCHENKLING, Junk Col. Cat., p. 15 (1932).
Niphades variegatus LEWIS, Cat. Col. Jap. Archip., p. 22 (1879); DALLA TORRE et SCHENKLING, Junk Col. Cat., 122, p. 94 (1932).

Stammform schwarz gefärbt, aber die Exemplare aus Kiushu rotbraun.

Fundorte: Sachalin (Maoka, 2 Ex., VI, 1907, Prof. S. MATSUMURA); Kurilen (Kamuikotan, 1 Ex., 20/VII. 1927, K. DOI); Hokkaido (Sounbetsu, 2 Ex., 14/VII. 1926, H. KÔNO, Nopporo, 1 Ex., 30/V. 1902, Prof. S. MATSUMURA, Sapporo, 1 Ex., VI. 1925, H. KÔNO); Honshu (Chichibu, 3 Ex., 15–17/VII. 1913, H. TAKABAYASHI, Chuzenji, 2 Ex., 25/VIII. 1915, Tokio, 2 Ex., E. GALLOIS, Berg Takao, 1 Ex., 9/VI. 1914, E. GALLOIS); Kiushu (Kumamoto, 4 Ex., 10/X. 1907, H. KAWAMURA).

Geographische Verbreitung: Sachalin, Kurilen, Hokkaido, Honshu, Kiushu, Sibirien.

J. N.: *Kuro-kobuzô.*

Gattung **Nipponiphades** n. g.

Stirn zwischen den Augen deutlich schmäler als der Rüssel. Rüssel dick, länger als das Halsschild, stark gebogen, zwischen Stirn und Rüssel

mit einer Querfurche. Fühlerfurche schräg, zur Unterrand des Auges gerichtet. Fühler vor der Mitte des Rüssels eingefügt; Schaft kaum erreicht den Vorderrand des Auges; Geissel länger als das Schaftglied. Schildchen rundlich, klein. Flügeldecken viel breiter als das Halsschild, Schulterbeule kräftig entwickelt. Pygidium völlig bedeckt. Vorderbrust mit einer tiefen Rüsselfurche. Vorderhüften fast aneinander stossend. Alle Schenkel mässig gekeult, fein gezähnt. Schienen kurz, bedeutend kürzer als der Schenkel, an der Basis stark gekrümmt, an der Spitze mit einem schwachen Endhaken. Klauen fein, frei.

Genotypus: *Scaphostetus foveolatus* HUSTACHE (1920).

Nipponiphades foveolatus (HUSTACHE) (Taf. V, f. 3)

Scaphostetus foveolatus HUSTACHE, Bull. Mus. Paris, p. 495 (1920).

Durch die schmale Stirn, die Basalquerfurche des Rüssels, die kurzen Schienen und die einfachen Klauen ist diese Art generisch von der Gattung *Scaphostetus* auszuscheiden.

Fundort: Honshu (Berg Takao, 1 Ex., 8/VI. 1933, E. GALLOIS, Narita in der Pref. Chiba, 1 Ex., 9/VI. 1914, E. GALLOIS).

J. N.: *Ko-kuro-anaakizô.*

Gattung *Himeniphades* n. g.

Stirn zwischen den Augen breiter als der Rüssel. Rüssel mässig kräftig, gleichmässig gebogen; Fühlerfurche schräg, zur unteren Augenhälfte ziehend, an der Fühlerbasis von oben sichtbar. Fühler nahe der Spitze des Rüssels eingefügt; Schaft kaum erreicht den Vorderrand des Auges, ungefähr so lang wie Geissel und Keule zusammen; Geissel viel kürzer als das Schaftglied, 7-gliedrig, das 7te Glied zur Keule gehörig; Keule verkehrt eiförmig. Halsschild an den Seiten mit kräftigen Augenlappen. Schildchen klein. Flügeldecken viel breiter als das Halsschild, mit je 10 regelmässigen Punktstreifen, Schulterbeule kräftig entwickelt. Pygidium bedeckt. Vorderbrust mit tiefer Rüsselfurche. Das 2te Bauchsegment so lang wie die 2 folgenden Segmente zusammen. Vorderhüften fast aneinander stossend. Alle Schenkel kräftig gekeult, ohne Zahn. Jede Schiene schlank, vor der Spitze stark gebogen, an der Spitze an der Innenseite mit einem starken Endhaken. Klauen einfach, frei.

Genotypus: *Himeniphades bipunctatus* n. sp.

Diese neue Gattung unterscheidet sich von *Niphades* durch die schmale Stirn und die gespaltenen Klauen.

Himeniphades bipunctatus n. sp. (Taf. VI, f. 4, 8)

Grundfarbe schwarz; Fühlerschaft ganz, Fühlergeissel an der Basis, Schenkel mit schwarzen Spitzen, Schienen und Tarsen rotbraun. Körper mit anliegenden Schuppen bedeckt, Rüssel grösstenteils, und Halsschild auf der Scheibe kahl; Schuppenbekleidung bräunlichgrau, schmutzig, die seitliche Längsbinden des Halsschildes, 2 rundlichen Makel der Flügeldecken hinter der Mitte und 2 runden Makel am Absturz der Decken weiss.

Kopf quer, schwach gewölbt; Stirn zwischen den Augen deutlich breiter als der Rüssel, in der Mitte mit einem schwachen Längseindruck. Rüssel mässig kräftig, etwas länger als das Halsschild, der ganzen Länge nach gebogen, zur Spitze hin ein wenig verdickt, hinter der Mitte an jeder Seite mit einer Längsfurche; die Punktierung gleichmässig, fein. Fühler etwas hinter der Spitze des Rüssels eingefügt; Schaft kaum erreicht den Vorderrand des Auges; Geissel kurz, viel kürzer als das Schaftglied, das erste Glied verkehrt konisch, das 2te schmal, länger als breit, die übrigen quer, zur Spitze hin verdickt; Keule verkehrt eiförmig. Halsschild ein wenig breiter als lang, an den Seiten schwach gerundet, in der Mitte am breitesten, an der Basis undeutlich gerandet, auf der Scheibe mit einer feinen Mittelfurche, am Vorderrand an den Seiten mit starken Augenlappen; die Punktierung ziemlich dicht. Schildchen sehr klein, rundlich. Flügeldecken viel breiter als das Halsschild, parallelseitig; die Punktstreifen fein; die Zwischenräume der Streifen breit, die abwechselnden Zwischenräume (Naht, der 2te und 4te) schwach gewölbt, der 4te Zwischenraum am Ende schwielenartig erhöht. Alle Schenkel kräftig gekeult. Jede Schiene schlank, an der Spitze stark gebogen, am Ende mit einem kräftigen Endhaken. Klauen einfach, frei.

Körperlänge: 3.5 mm.

Fundort: Honshu (Wakamatsu, 1 Ex.-Holotypus, X. 1932, H. Kôno, Komaba, 1 Ex., S. Hirayama).

J. N.: *Kagiashi-zô.*

Geographische Verbreitung der japanischen Hylobiinen:

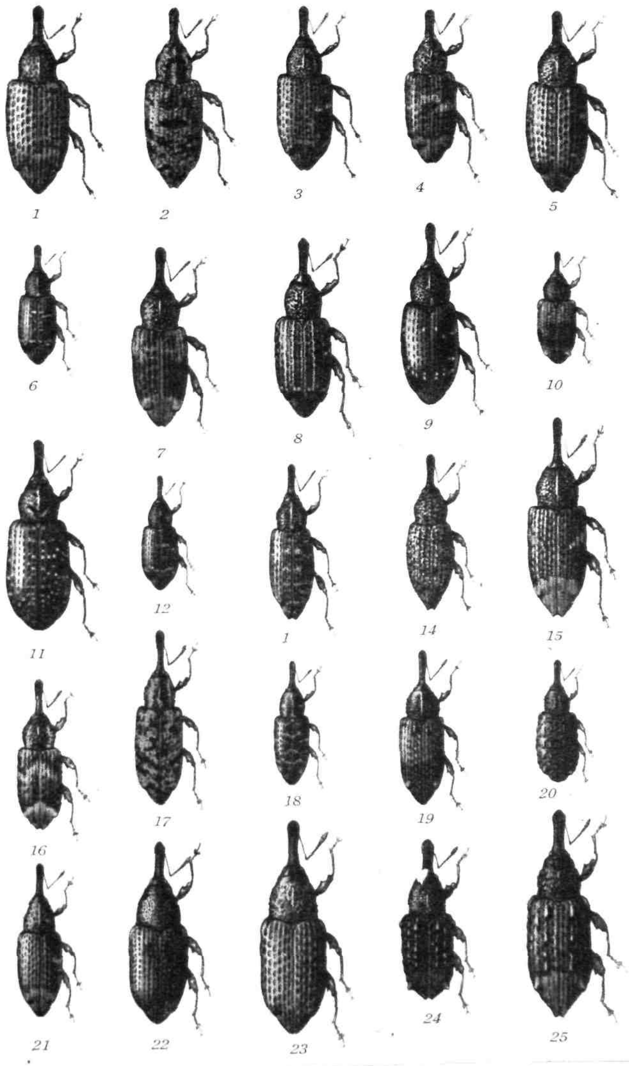
Aus der folgenden Übersicht der geographischen Verbreitung der Arten von Hylobiinen ist ersichtlich, dass nur wenig Material aus Kiushu und Korea vorliegt. Deshalb konnte ich hier nicht die faunistische Stellung der einzelnen Inseln erörtern.

Arten \ Fundorte	Sachalin	Kurilen	Hokkaido	Honshu	Shikoku	Kiushu	Okinawa	Formosa	Korea	Sonstige Fundorte
Unterfamilie *HYLOBIINAE*										
Tribus *HYLOBIINI*										
Gattung *ACLEES* SCHÖNHERR										
1. *Aclees taiwanensis* KÔNO								×		
2. *A. hirayamai* KÔNO							×	×		
Gattung *HYLOBIUS* GERMAR										
3. *Hylobius adachii* KÔNO				×						
4. *H. albosparsus* BOHEMAN	×									Sibirien
5. *H. abietis haroldi* FAUST				×	×	×			×	Sibirien
6. *H. niitakensis* KÔNO								×		
7. *H. pinastri karafutonis* KÔNO	×		×							
8. *H. montanus* KÔNO			×							
9. *H. kanoi* KÔNO								×		
10. *H. aeneiventris* HUSTACHE				×	×					
11. *H. cribratus* ROELOFS				×	×					
12. *H. freyi* ZUMPT			×	×	×					
13. *H. koreanus* KÔNO									×	
14. *H. shikokuensis* KÔNO					×					
15. *H. yakui* KÔNO			×	×						
16. *H. galloisi* KÔNO			×	×						
17. *H. gigas* KÔNO			×							
18. *H. elongatus* ROELOFS				×						
19. *H. insularis* (KÔNO)			×							
20. *H. exsculptus* ROELOFS				×						China
21. *H. minowai* KÔNO								×		
22. *H. okinawanus* KÔNO							×			
23. *H. orientalis* (MOTSCHULSKY)						×				China
24. *H. orientalis formosanus* ZUMPT								×		

Fundorte / Arten	Sachalin	Kurilen	Hokkaido	Honshu	Shikoku	Kiushu	Okinawa	Formosa	Korea	Sonstige Fundorte
25. *H.* *cribripennis* (Mats. et Kôno)		Ins. Hachijo								
26. *H.* *perforatus* Roelofs						×	×	×		China
27. *H.* *desbrochersi* Zumpt				×	×					
28. *H.* *pustulatus* Kôno								×		
Gattung *DYSCEROIDES* Kôno										
29. *Dysceroides bipustulatus* Kôno								×		
Gattung *KOBUZO* Kôno										
30. *Kobuzo rectirostris* (Roelofs)				×						
31. *K.* *kikuchii* Kôno								×		
Gattung *POIYAUNBUS* Kôno										
32. *Poiyaunbus gebleri* (Boheman)			×	×						Sibirien
Gattung *OKIKURUMINUS* Kôno										
33. *Okikuruminus oblongus* (Hustache)				×						
34. *O.* *roelofsi* (Harold)			×							
35. *O.* *roelofsi sachalinensis* Kôno	×	×								
Tribus *LIPARINI*										
Gattung *LIPARUS* Olivier										
36. *Liparus lewisi* (Roelofs)				×						
Gattung *EUTHYCUS* Pascoe										
37. *Euthycus japonicus* Heller				?						
38. *E.* *excisus* Heller								×		
Tribus *LITHININI*										
Gattung *NIPHADES* Pascoe										
39. *Niphades variegatus* (Roelofs)	×	×	×	×		×				Sibirien
Gattung *NIPPONIPHADES* Kôno										
40. *Nipponiphades foveolatus* (Hustache)				×						
Gattung *HIMENIPHADES* Kôno										
41. *Himeniphades bipunctatus* Kôno				×						

Erklärung der Tafel V

1. *Hylobius gigas* KÔNO ♀
2. *H.* *laeviventris* HUSTACHE ♀
3. *H.* *freyi* ZUMPT ♂
4. *H.* *galloisi* KÔNO ♂
5. *H.* *shikokuensis* KÔNO ♀
6. *H.* *montanus* KÔNO ♂
7. *H.* *desbrochersi* ZUMPT ♀
8. *H.* *yakui* KÔNO ♀
9. *Poryaumbus gebleri* BOHEMAN ♀
10. *Kobuzo rectirostris* ROELOFS ♀
11. *Hylobius albosparsus* BOHEMAN ♀
12. *H.* *pinastri karafutonis* KÔNO ♂
13. *Ohikuruminus roelofsi* HAROLD ♂
14. *O.* *oblongus* HUSTACHE ♂
15. *Hylobius orientalis formosanus* ZUMPT ♀
16. *H.* *perforatus* ROELOFS ♂
17. *H.* *kanoi* KÔNO ♀
18. *H.* *niitakensis* KÔNO ♂
19. *Dyscerroides bipustulatus* KÔNO ♂
20. *Niphades variegatus* ROELOFS ♀
21. *Hylobius* [illegible] KÔNO ♂
22. *Aclees hirayamai* KÔNO ♂
23. *A.* *taiwanensis* KÔNO ♂
24. *Kobuzo kikuchii* KÔNO ♀
25. [illegible]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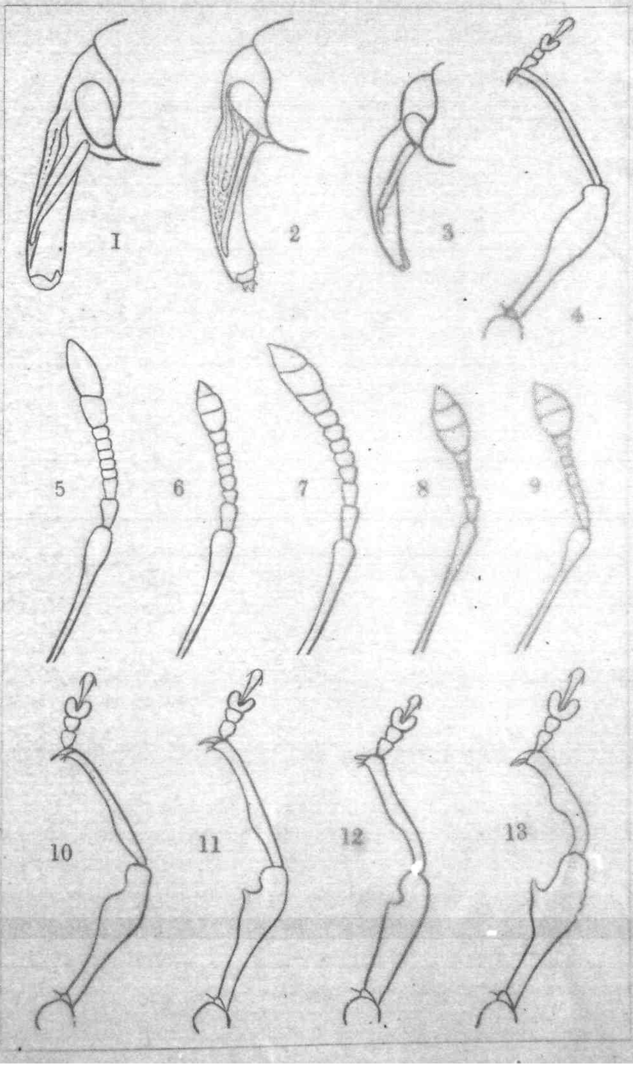
Erklärung der Tafel VI

1. Kopf von *Kobuzo kikuchii* KONO
2. Kopf von *Dysceroides bipustulatus* KÔNO
3. Kopf von *Nipponiphades foveolatus* KÔNO
4. Vorderbeine von *Himeniphades bipunctatus* KÔNO
5. Fühler von *Acicnemis toiwamensis* KÔNO
6. Fühler von *Kobuzo rectirostris* ROELOFS
7. Fühler von *Dysceroides bipustulatus* KÔNO
8. Fühler von *Himeniphades bipunctatus* KÔNO
9. Fühler von *Hylobius abietis haroldi* FAUST
10. Vorderbeine von *Hylobius freyi* ZUMPT
11. Vorderbeine von *Hylobius yokai* KÔNO
12. Vorderbeine von *Niphades variegatus* ROELOFS
13. Vorderbeine von *Dysceroides bipustulatus* KÔNO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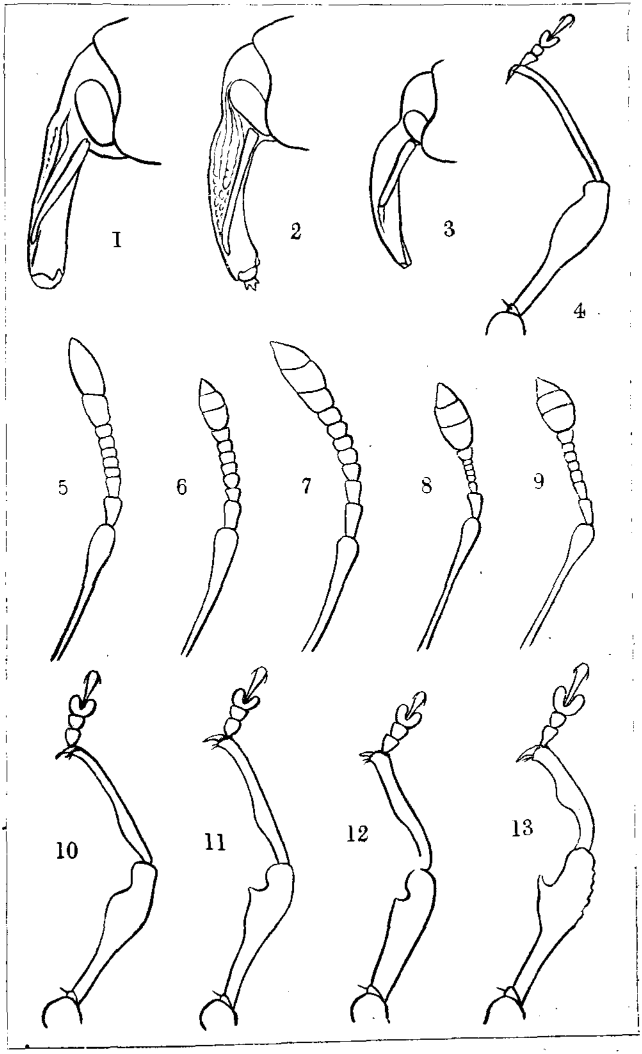
Erklärung der Tafel VI

1. Kopf von *Kobuzo kikuchii* Kôno
2. Kopf von *Dysceroides bipustulatus* Kôno
3. Kopf von *Nipponiphades foveolatus* Kôno
4. Vorderbeine von *Himeniphades bipunctatus* Kôno
5. Fühler von *Aclees taiwanensis* Kôno
6. Fühler von *Kobuzo rectirostris* Roelofs
7. Fühler von *Dysceroides bipustulatus* Kôno
8. Fühler von *Himeniphades bipunctatus* Kôno
9. Fühler von *Hylobius abietis haroldi* Faust
10. Vorderbeine von *Hylobius freyi* Zumpt
11. Vorderbeine von *Hylobius yakui* Kôno
12. Vorderbeine von *Niphades variegatus* Roelofs
13. Vorderbeine von *Dysceroides bipustulatus* Kôno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A STUDY ON THE DEVELOPMENT OF THE TUSSER WORM, *ANTHERAEA PERNYI* GUÉR.

BY

SABURO SAITO

(With five Plates)

INTRODUCTION

So far as the writer is aware, knowledge of the embryology of insects in general is very poor though the study of the other animal groups in this field has had tolerable advancement recently. Apart from CHOLODKOWSKY's work (1889) on the development of Coleoptera and WHEELER's (1889) on Orthoptera, most works on the embryology of insects so far published have been confined to Lepidoptera. More particularly, with a few exceptions such as BOBRETZKY (1878), EASTHAM (1828, 1930) and JOHANNSEN (1929) who worked on the common butterflies (*Pieris*, *Diacrisia* and *Porthesia*), almost all other workers such as DOHRN (1876), TICHOMIROFF (1879), GRABER (1891), TOYAMA (1896, 1902), etc. rather specialized on the development of the silkworm, *Bombyx mori*, one of the most convenient sdecies of domesticated silkspinners for our use.

Fortunately there is still another silk spinner, the tusser worm, which is confined to a small place in middle Japan known as Ariakemura, a village in Nagano Prefecture where because of the high value of the silk produced by the worm it is cultured in half wild state. Years ago however an attempt was made to transplant the insect to Gumma Prefecture, in the neighbourhood of its original habitat, but it was unsuccessful. Ariakemura is accordingly the only locality in Japan, where the insect prospers. At the same time it seems true that the worm rather prefers a dry place as it is also adapted to China, Manchuria and Korea.

In its original habitat the spinner is of a bivoltine species but in Sapporo where the writer cultured it having brought it as cocoon, it becomes univoltine, simply because the cold season sets in before the eggs have hatched out. In addition the process of development is retarded greatly in this city as compared with that in the original locality. In

[Jour. Facul. Agr., Hokkaido Imp. Univ., Sapporo, Vol. XXXIII, Pt. 4, June, 1934]

Sapporo from the time of deposition of eggs untill the hatching it takes more than one month since the eggs deposited on the 10th of May 1927, for example, hatched out on the 16th of June. In 1929 on the other hand even one and a half months was required. In Ariakemura, on the contrary, only from six to seven days elapse from the deposition of eggs to the emersion of the larvae. This difference which is by no means small, is doubtless due mainly to the atmospheric temperature which at that season of the year in Sapporo registers 12.6°C. on the average, while in Ariakemura it shows 21.0° C.

Now among insects it is unique that the eggs of the tusser worm are extraordinarily large in size, measuring 3–4 × 3 mm. in diameter. This affords a great advantage for the study of embryology at any rate. Another convenience is that almost a complete series of stages of development can be obtained by raising the animal in Sapporo. Furthermore, contrary to the common silk worm, the tusser worm should supply a disirable material for the general study of insect development free from any possible modification which might be effected under domestication. This is the reason why the writer has undertaken the present study with this worm in the hope that much light might be thrown upon insect embryology.

The problem was first suggested by Dr. S. HATTA, Professor Emeritus of Hokkaido Imperial University, under whose guidance and direction the present study has been completed. The writer appreciates the courteousness of Dr. M. YAMANOUCHI who encouraged him to undertake the present work and retired from the field through he had started a similar study before him. The author wishes also to express his thanks to Dr. T. INUKAI for his constant help and encouragement during the work.

I. Materials and Methods

The material employed in the present work consisted entirely of the eggs of the tusser worm, *Antheraea pernyi* GUÉR. In May 1927 some cocoons were obtained in Ariakemura and shipped by rail to Sapporo. Yet they were kept alive as normal. Then they were placed carefully in a row in a wooden box. Soon after their arrival at Sapporo the moths emerged from the cocoons at which time copulation took place. It was then observed that out of 200 cocoons, only 70 were female, i. e. about 1/3 of the whole. In 1929 again, 100 cocoons were obtained also from the same locality. In this case the ratio of male moths to the female was approximately equal being 48 to 45.

Generally a female deposits from 200 to 259 eggs, the average being

239. The eggs used as the material in the present work were counted, therefore, to about 25000 in number. As development proceeded quickly in the early stages, the killing of the eggs at first was done immediately after deposition four times per day, namely at 6 a. m., 12 noon, 6 p. m. and at mid-night, but later they were killed only twice a day, i. e. at 8 a. m. and 8 p. m.

The reagents employed as fixatives consisted of 0.5 % chromic acid, nitro-acetic acid diluted with 10 volumes of water, saturated solution of corosive sublimate, or ALLEN's modified solution of BOUIN's fluid. They were used at a temperature of 70-80° C. and reacted until cooled which lasted usually for 10 hours. After being taken out of reagent, the eggs were throughly washed with running water and placed in 50 % alcohol. After two days they were put into 79% alcohol in which they were preserved until used. Of the four reagents above mentioned, ALLEN's modified solution proved most favorable.

In the hardened eggs the egg-shell or chorion was not closely attached to the egg content as in the living state, but was separated from it by a space, so that the shell was removed from the egg by means of a needle without trouble. For the sake of convenience in treating the material a part of the blastoderm, the so-called ventral plate, was cut off from the remaining part of the egg, as the latter consists mostly of the yolk.

The ventral plate thus prepared was stained *in toto* with staining fluids which consisted of either alcoholic picro- or borax-carmine solution. When the latter was employed, the objects were placed in acidulated alcohol to remove the superfluous staining. The objects were then transferred into alcohols of higher grades and if not sectioned, they were infiltrated by use of xylol and embedded in Canada balsam as the finished preparate.

The material which were cut into serial sections, were also first stained *in toto*, borax-carmine being preferable especially in this case. After dehydration by absolute alcohol the material was put in xylol and then in xylol-paraffin. The procedure was carried out in thermostat until the material was inbedded in paraffin as usual. Complete serial sections, 10 microns in thickness, were made with a GROOT's microtome and mounted in order with egg albumin. The sections were clarified with xylol and mounted in Canada balsam.

All the figures illustrating the foregoing process have been drawn by means of the Camera Lucida of ABBE's system.

The observations have been made first of all on the superficial features of the embryo. The internal changes which occur during the development

were next examined by means of the serial section.

II. Structure of the Egg

The just deposited egg is brown in colour and depressed ellipsoid in shape, being 3–4 mm. across the long axis, and 3 mm. in transverse diameter, with a thickness of 2 mm. One pole of the ellipsoid is somewhat pointed, whilst the other is rounded or rather obtuse. The head of the future embryo is directed toward the acute pole, accordingly the other pole is occupied by the posterior end of the body. The whole egg is coated with a thick elastic chorion, the outside of which it is covered again with a waxy substance of brown colour[1]. Hence if the latter is taken off and the egg is immersed in alcohol, the chorion becomes semitransparent.

The egg has two investing membranes, the inner of which is very thin, transparent and structureless i. e. the vitteline membrane which adheres directly to the yolk and the outer is the chorion which is thick, semitransparent and tough. Though according to the study of the fly's egg by HENKING (1892) and emmet's egg by BLOCHMANN (1884)[2] the chorion is composed of two layers, "Endchorion and Exochorion", such a structure was not recognizable in the tusser worm egg. It is single layered and by reflected light whitish in colour.

The inner surface of the chorion is smooth, but the outer is possessed of elevations or protuberances which appear sometimes round and sometimes oval in shape under low magnifications, these being, strictly speaking, hexagonal in outline as closer examination proves. The outgrowths in question are scattered all over the outer surface of the chorion, existing closer together towards the acute pole of the egg, in the centre of which there is a micropyle. According to TOYAMA and ISHIWATA (1896) in *Bombyx* there are visible numerous minute pores for the respiration of the egg, to give off carbon dioxide and to take in the atmospheric air. However, the writer has failed to fined the occurrence of such pores in this case.

Directly inside the vitelline membrane, there is found an extremely thin layer of protoplasm, which consists of the peripheral layer of the formative cytpolasm. It is called the centrolecithal ovum. It is evident that the protoplasm furthermore fills up the space between the food yolk granules which occupy the central part of the egg forming a scanty reticulum, although it does not always appear in the sections. The yolk

1) This is not the proper of the chorion, but is due to that of the yolk shining through the chorion which is dark yellow when dried.

2) The original paper by BLOCHMANN (1884) was not accessible to the writer who has learned of it only through HIRSCHLER's (1924) accounts.

granules are spherical in shape and are much smaller at the periphery than in the centre of the egg. Besides the granules of the yolk there are transparent fat globules of various sizes and a translucent albuminous substance which appears as poligonal masses by fixation.

The yolk in the fresh state crushed between the slide and the cover glass contains also plenty of oil globules of different size, strongly refracting the light and a greater number of spherical albuminous masses.

In the hardened eggs the yolk makes a network with meshes of various size. The structure is often seen in sections of eggs hardened in saturated sublimate or picrosulphuric acid. The yolk granules however undergo gradual changes into a liquified structure in the course of embryonal development.

III. Segmentation and Formation of Blastoderm

Since the segmentation of the egg in this worm, as in the other insects, is of a superficial type, i. e. the process goes on within the yolk, it is naturally not possible to observe the early development from the outside. The eggs remain unchanged as seen externally until the ventral plate is first differentiated from the blastoderm.

The first segmentation nucleus of the egg from 12 to 24 hours after oviposition lies in the periphery near the micropylic pole with an acute end. The nucleus is embedded in the mass of the peripheral cytoplasm. Changes occuring in the nucleus are seen rarely owing to the difficulty of satisfactory fixation due to the yolk mass which does not allow the application of ordinary methods for preservation of the cytological details [1].

The cleavage nucleus (Fig. 1b) is round in shape with a large nucleolus (no) surrounded by a thick layer of cytoplasm (cy), which in the egg hardened in picrosulphulic acid often appears as astral radiations. The outer layer of the cytoplasm generally disappears by degrees into the surrouding yolk substance.

The nucleus continues to divide until about 60 to 80 nuclei are formed. Each of these nuclei thus formed is surrounded by the astral radiated cytoplasm and scattered irregularly in the yolk. However the distribution of the nuclei is first limited to approximately the upper ⅓ acute part of the egg.

The nuclei which now appear amoeboid in shape commence to migrate to the surface of the egg (Fig. 1a). First, the nuclei (n) take a spherical

1) The chorion is tough and apparently impervious to fixing fluids in short time, and so, it was necessary to use the heat-method.

arrangement at the acute pole of the egg, each having a long cytoplasmic tail which is directed toward the centre of the sphere. This sphere of nuclei expands gradually until it reaches the egg surface, first at the micropylic pole, then, by enlarging the inscribed circle, to the posterior part. In consequence of the asymmetrical swelling of the sphere it happens that the micropylic pole is first occupied by the nuclear layer at the right side, then on the left side and finally at the opposite pole.

On reaching the periphery, the nuclei assume a conical form and then become gradually flattened. The multiplication of the nuclei after reaching the surface occurs very rapidly. In addition to this it is remarkable that the nuclei at the surface at the same time are continuously reinforced by others migrating from the yolk. The latter is nothing else than the descent of the cleavage nuclei which remained in the yolk yet continue to divide while the other ones are moving to the periphery. With the increase of the nuclei at the periphery there appears a distinct boundary between the cells. In this manner, the epithelial one cell layered tissue which is distinctly demarcated from the inner yolk mass is formed (Fig. 2).

The egg next enters the blastoderm stage, the blastoderm being at the periphery while the yolk and its cellular elements remain in the central part.

Fig. 2 is a cross section through the centre of an egg in the blastoderm stage. Examining carefully one sees that the blastoderm (bl) exhibits an epithelial structure only at one side of the egg, while at the opposite side it shows a rather loose structure in which the round cells arrange as in a chain.

It is marked that since the first division of the cleavage nucleus the nuclei have undergone a steady diminution in size. The cleavage nuclei which no longer take part in the formation of blastoderm remain in the yolk and become the yolk cell or vitellophag (Fig. 1c) which retains the original amoeboid structure until a later stage. However it is clear that there is originally no difference between the blastomere and the yolk cell. In fact, nothing indicates an early differentiation of cells destined either to remain in the yolk or to form the blastoderm. Later the yolk cell is large in size as compared with the blastomere (Fig. 1b), with a large spherical nucleus (n) which is provided with fine chromatic granules but without a nucleolus, surrounded by a thin amoeboid cytoplasmic coat (cy). The vitellophags increase in number simply serving as a kind of nutritive cells connected with the liquifaction of the yolk. They are sometimes binucleated being destined to degenerate sooner or later. In the meantime one

observes among vitellophags with amoeboid masses of cytoplasm, several nuclei which are somewhat smaller than normal and show no marked difference between the poly-nucleated, ordinary vitellophags which are of degenerating nature.

The yolk granules in the egg are distributed at first nearly homogeneously, but at the early blastodermic stage the yolk mass is divided into a number of distinct spheres from the peripheral part. Then, at the end of the blastoderm stage this yolk division extends to the entire yolk mass (Fig. 4), each sphere enclosing one, less commonly, two or more yolk cells, thus each yolk spherule (Fig. 1c) becomes a unit of one cell. The process is designated as the secondary segmentation of the yolk.

It is desirable to give here the approximate time required for the development so far described. Probably the first and second polar spindles are formed in the ovaries or during oviposition in this worm. The fusion of the female pronucleus with the male takes place during the first day after oviposition, and this is followed soon by the appearance of the cleavage nucleus in the acute end of the egg. Next the rapid division of the cleavage nucleus is carried on and the arrangement of the nuclei thus formed at the egg surface occurs by the end of the second day. During the third day of development the blastoderm is differentiated.

IV. Differentiation of the Ventral Plate

As soon as the blastoderm is completed by the rapid multiplication of the blastomere, i. e. the peripheral cells, and at the same time by the insertion on the inner segmentation nucleus, there occurs an unequal development in it. The blastoderm becomes exceedingly thin on the left surface where the cells exist much scattered, and contrary to this the blastoderm on the right side is thickened to become two or three layered epithelium (Fig. 4). Moreover a slight contraction both from the cephalic and caudal ends towards the centre of the thickened right side occurs and thus the germ band or "ventral plate" is formed. The aggregated mass of cells or ventral plate (vp) is distinctly marked from the remaining part of the blastoderm which now consists of rather larger and scattered cells. It occupies the area of two thirds of the centro-lateral surface in the egg as seen in the figures (Figs. 3 a, b and 4).

The exact mode by which the germ band is formed is only seen by a median cross section of an egg (Fig. 4). BOBRETZKY (1878) noted the same condition in Lepidoptera (*Pieris crataegi* and *Porthesia chrysorrhoea*)

and WOODWORTH (1889)[1] likewise noted the fact in Evanessa. JOHANNSEN (1929) also recognized a similar process and so figured it, although he states that the completion of the germ band is due only to the partial increases of the cells, that is, the cells at the micropylic end and at the lower pole of the egg remain undivided, while the cells around the centre of the egg actively divide by mitosis. The thickening of the germ band is carried out by radial lengthening of cells on the ventro-lateral side of the egg, and then it becomes a two-cell layer, while the blastoderm at the dorsal side of the egg remains the same. KOWALEWSKY (1871) also states that in *Apis mellifica* the cells which constitute the germ band are originally smaller and flatter than those which form the extra-germ band.

At the transition point from the germ band into the extra-germ band there occurs the infolding of the blastoderm to make the so-called "amniotic folds" (Fig. 4, amf) around the germ band. The folds appear as a double fold of the blastoderm, and on further development the caudal and cephalic folds grow much more rapidly than the lateral. The amniotic fold gradually envelops the germ band, its cells becoming more flattened and scattered as it grows (Fig. 5). The fold and the blastoderm of the extragerm band continue to become thinner and thinner. As to the further development of the amniotic fold the matter will be treated again later.

V. Changes of the External Structure

Here, for the sake of convenience to make the matter clear to the understanding let us turn our attention to the external change of the embryo, discerning three stages from the time the formation of the ventral plate until hatching.

STAGE I

By this stage the ventral plate has differentiated from the blastoderm, caused by thickening as mentioned above. So far as the writer is aware, WHEELER (1889) was the first to observe the earliest stage of the development of the ventral plate in the insect (*Xiphidium*). According to him before formation of the ventral plate the cells of blastoderm are specially concentrated at four different points, two on the median line and two others across it, which are destined to be converted into two procephalic lobes, a caudal end and an indusium respectively. A similar structure is said

1) The writer could not see the original papers by WOODWORTH (1889) and by KOWALEWSKY (1871), but the former was cited from JOHANNSEN's accounts and the latter from BOBRETZKY's paper respectively.

to be seen prior to the formation of the ventral plate in some Crustacea (*Astacus, Homarus*). The condition, however, is very different in the present form.

The youngest stage with which the present writer has dealt is at 120 hours of age somewhat trapezoidal shape in outline distinctly maked from the other parts of the blastoderm. The anterior edge of the trapezoid plate, as it may be called, represents the cephalic end of the future embryo, while its basal part becomes the caudal end. In the following development the total plate is constricted segmentally along its median line which corresponds to the median plane of the embryo. Next, another transverse constriction arises anteriorly and the earliest beginning of the two cephalic lobes is formed (Fig. 6). At this stage the ventral plate has become entirely thickened and looks rather more solid than flat.

STAGE II

Next comes the stage (Fig. 7) in which the ventral plate is remarkably decreased in breadth at the anterior edge or cephalic end and is elongated along the longitudinal axis making a posterior protuberation in the middle part of the plate. The plate elevates at the four corners simultaneously; the anterior elevations make the cephalic lobes (cl), behind which there appear anterior lateral grooves. The longitudinal groove between them has also become very distinct and this is nothing else than "the primitive groove" (pg) which becomes more and more striking stage by stage (Figs. 7–11). The ridges bordering the above mentioned groove may for convenience be called "the primitive ridges". The groove and the ridge extend backwards to fade out at a short distance posteriorly.

Later the posterior pair of elevations of the ventral plate gives rise simply to the hindmost segments of the worm known as "the caudal lobes" (Cd.). The embryo at the instant consists, therefore, of the paired cephalic and caudal lobes and the unsegmented intermediate part (us).

In an embryo of advanced stage (Fig. 8), the intermediate part constricts off a segment (s^1) at its anteriormost part. As later changes show (Figs. 9–11), the other segments are added one after another behind this one, and so the segment must be referred to as "the first body segment".

Further segmentation of the ventral plate is brought about simply by shallow constriction which becomes deeper as the stage advances being more distinct also from the side towards the median line, as clearly seen with transmitted light (Fig. 10, s^1, s^2). This process is exhibited more obviously in the later stages (Figs. 13, 14).

At the next stage (Figs. 9, 10) the so-called primitive groove which shows the main axis of the future embryo, extends posteriorly with distinct lateral primitive ridges on both sides as before (pg). It is a narrow longitudinal groove which suddenly widens posteriorly and at the same time becomes shallow gradually to be brought up at last to the general level of the ventral plate. The hindmost part of the ventral plate in this stage becomes very distinct and makes the caudal lobes (Cd). As the whole ventral plate diminishes in breadth the embryo now assumes the form of a shield (Fig. 11). The approaching of the primitive ridges toward each other to close the groove takes place at first in the part of the second segmental constriction and extends gradually from that point either backwards or forwards (Fig. 12, pg), so that it remains open both in the anterior and posterior parts until a later stage (Figs. 12, 13, ap, bp). The closure is followed by the coalescence of the ridges which have been brought in contact at the free surface. As a consequence of the process an internal canal remains which represents the early state of "the archenteron". The hindmost part of the primitive groove remains wide open for a while being often designated as "the blastopore" (Fig. 13, bp.). In a strict sense however the blastopore should be the primitive groove itself as will be explained later.

The so-called amnion fold which arises as the folding of the blastoderm around the ventral plate, is detected as early as Stage I (Fig. 6), in which the ventral plate is just formed.

The groove is visible in the one week (168 hours) old individual as a mere furrow but in a 176 hours old embryo (Fig. 16) it is obliterated without leaving any trace. The anterior extremity of the groove opposite to the blastopore (Figs. 13, 15, ap) is closed at about the same time as the latter (Fig. 16).

At the next stage (Figs. 15, 16) a median longitudinal furrow appearing on the segments thus formed can be seen. This is "the neural groove" (nf). There is apparently no connection between the neural groove and the primitive groove. At this stage one can see externally about 8 body segments but internally when seen by transmitted light there are 12 (Fig. 14).

STAGE III

This stage (Figs. 17, 18) is represented by the 184 hours (7-8 days) old embryo and is sharply marked from the preceeding by two features. First, all the body segments have completely developed by this stage

including three cephalic, three thoracic, and ten abdominal (s^{7-16}) ones. Besides this the cephalic and caudal lobes (cl, Cd) are also striking. Second, from the segment the anlage of the cephalic and thoracic appendages are beginning to appear. In addition to this the stomodaeum (st) which is continuous with the archenteron becomes obvious at the anterior extremity of the body between two cephalic lobes. It may be seen that the inner angle of the cephalic lobe produces the anlage of the antenna (at), while its anterior edge is giving rise to the labium (lb). At this stage the thoracic appendages are built powerfully (thl^{1-3}) and are easily distinguished from the cephalic appendages (md, mx^1, mx^2) which are still rudimentary. On the abdominal segments (s^{7-16}) the neural furrow (nf) is still conspicuous, whereas that on the thorax has already faded. The caudal lobes which were formerly very striking (Figs. 7-16), become the terminal segment of the body, which is brought about by the obliteration of the median furrow separating the lobes.

In an older individual (Figs. 19, 20) of this stage, not only the cephalic and thoracic appendages are again divided transversally into two segments, but also all the abdominal appendages (abl^{1-10}) become very clear. The neural furrow fades at this stage except for some individuals. The lobular structure of the caudal lobes is entirely lost, they occupying merely the hind extremity of the body.

The cephalic lobes which embrace the stomodaeum (st) from both sides, are rounded in outline at first (Figs. 17, 18) but soon widen transversely (Fig. 20).

At this stage there is about to be revealed a developmental fact which is very characteristic and interesting. First of all one recognizes the embryonic body grows so that it attains its maximum length (Figs. 21, 22). However the body length shrinks and shortens thenceforth in the next advanced stage (Figs. 23-25). Secondly during the advancement all the abdominal segments carry a pair of appendages (abl^{1-10}), except for the hindmost segment which has been derived from the caudal lobes. The latter is first perforated by the proctodaeum (pr), and then later a pair of appendages (cal) are formed on it. All the segments may now be recognized as homomerous so far as the external morphology is concerned. In the meantime the cephalic and thoracic appendages lengthen further to be segmented while the abdominal ones remain unsegmented. Heteromerity comes in, however, very soon, some segments losing their appendages and some moreover coalescing to other segments, as later history shows.

The stomodaeum has undergone changes in respect to its aperture

which is diminished in width. The antennae (Fig. 24, at) are segmented into two, while the labium (lb) grows in dimension.

Now the striking feature acquired by the embryo in the present stage (348 hours, 14 days) in the reduction of the body length (Figs. 25, a, b, c) being shortened by about 20 % in total length and on the contrary, the increase of thickness as compared to the measurements of the preceding stage (Figs. 21, 22).

In addition to this, on the six abdominal segments —— the first, the second and from the seventh to the tenth —— the appendages have disappeared (Figs. 25, a, b, c). Therefore as the persistent appendages which are retained throughout life (Figs. 24-27, abl^{3-6}), all the cephalic and thoracic affixes and four abdominals are enumerated. These on the abdominals develop further to be segmented into two articulations.

As to the cephalic and thoracic appendages, there is little change, all the thoracic ones being segmented now into three, the two posterior cephalic (mx^1, mx^2) into two, while the first cephalic (md) remains one-segmented as before. The antennae are also bi-segmented. On the other hand, the first and second cephalic appendages have grown remarkably in length but the last cephalic (mx^2) is, contrarily, shortened as the development advances, as seen in the figures. The labium (lb) grows stage by stage so as to reduce the dimension of the entrance of the stomodaeum gradually.

Besides the shortening of the body length, it is to be noted that in advanced stages the tenth abdominal segment is coalesced with the last caudal segment (Fig. 25). It happens then that the ninth segment is again fused with it (Fig. 27). At the anterior part of the embryo the paired rudiment of the labium is now lost to a great extent to be converted ultimately into an unpaired median structure bordering the stomodaeum in front (Figs. 25–27, lb). Of the eight remainning abdominal segments, four —— the first, the second, the seventh and the eighth —— are free from appendages and smooth on their surface (Fig. 27). By the growth of the embryo in body thickness the appendages on a segment which attach closely together in the early stage separate from one another leaving a wide space between them. The anlage of the stigma (stg) is first seen both on the side of thoracic and abdominal segments at the stage in which the obliteration of the abdominal appendages takes place (Fig. 24). The umbilical canal (amc) is very much reduced in circumference. The external form of the larva is now completed.

VI. Revolution of the Embryo

Here attention must be directed to the position of the embryo in the egg which differs greatly from the other kind of animals. At about 100 hours of development, the ventral plate extends longitudinally so as to cover one lateral side of the yolk surface.

As is well known, at the stage when the origin of appendages appears the dorsal surface of the embryo is directed toward the centre of the egg and accordingly the embryonic body shows a heavy dorsal bend (Fig. 28, a). As the embryonic membranes develop there occurs the invasion of the yolk granules between the amnion and serosa; this causes the embryo to sink deep into the yolk. At the same time a reduction of the body length takes place, and then the embryo is gradually removed toward the centre of the egg so that the dorsal bend is a little decreased in degree.

As the embryo which is situated at present along the longitudinal axis of the egg, grows in length in this position, the anterior half of the body bends ventrally, so that the body takes an S shape (Fig. 28, b). The further growth of the embryo, and the rapid consumption of the yolk lead the embryo, particularly the dorsal part, to remove to the opposite side to the place where the ventral plate was first differentiated out of the blastoderm, commencing at the posterior end and extending progressively anteriorly. Now the body begins to bend ventrally and at last shortly before the hatching, the dorsal wall of the embryo comes directly under the bottom of the micropyle. Thus a revolution in the position of the embryo has been brought about (Fig. 38, c). It would appear, from the above, that the revolution is caused simply by the mechanical locomotion of the embryo resulting from the growth of the body and the decrease of the amount of yolk.

GENERAL CONCLUSION AND COMPARISONS

Taking into consideration the differentiation of various parts of the body revealed in every stage as described above, attention should be given to generalize on the whole development of the external form. The most anterior and the most posterior segments, namely the cephalic and caudal lobes respectively, are the first to differentiate from the ventral plate and this paired origin is in contrast to the remaining body segments which are formed one after another as unpaired metameres. The hindmost body segment is formed first at stage III (184 hours), whereas the foremost is already constricted off at stage I (136 hours). The part lying between these two

extreme segments differentiates into the body segments as just stated, the differentiation going on from the front backwards. When fully established, the body segments number sixteen, of which the anterior six constitute the three cephalic and three thoracic, while the remaining ten posterior segments, represent the abdominal segments. In addition to these there come the cephalic and caudal lobes, so that the whole body is composed of eighteen metameres. These eighteen segments are homomerous, as is clearly seen at the time when the embryo attains its maximum body length. Each segment has a pair of appendages. However further structural changes soon set in. On the first, the second, the seventh, the eighth, the ninth and the tenth abdominal segments the appendages disappear, while those on the other segments transform into the limbs characteristic to the body regions to which they belong. As already incidentally touched upon, the mandibles are differentiated from the first body segment, the second and the third body segments give rise to the first and the second maxillae, and the following three —— from the fourth to sixth —— constitute the thoracic segments which produce the three pairs of thoracic limbs. The four abdominal segments produce the persistent limbs. A pair of limbs on the terminal segment is produced from the caudal lobes. From the cephalic lobes, the antennae are protruded. Whether the labium which is formed in pairs like the cephalic lobes, represents a segment or not, the writer can not determine at present.

It would appear, from the above observation, that the body segments develop homomerously under the domination of the palingenesis of the insect. Coenogenetical influence, however, causes heteromerity which is the case in later stages.

Most of papers hitherto published dealing with insect embryology attempted to elucidate the development of the meso- and ento-derm (Untersblatt) and only a few of them described the external change of the embryo.

One can enumerate N. BOBRETZKY (1878), K. TOYAMA (1902), O. A. JOHANNSEN (1929) and L. EASTHAM (1928, 1930) who contributed to our knowledge on the embryology of the Lepidoptera.

N. BOBRETZKY (1878) working principally on the formation of the blastoderm of *Porthesia* observed two bodies in the interior of the egg at the earliest stage, each consisting of a nucleus enclosed in a thin protoplasmic layer with stellate prolongation. By a continuous division of the nuclei, they become scattered through the interior of the ovum, some of them passing to the surface simultaneously. At the surface the protoplasm around

each nucleus contracts itself to become a rounded cell body, distinctly cut off from the adjacent yolk and thus the blastoderm is formed.

S. SCHWARTZE (1899) who made a careful study of the Chinese silk worm, *Lasiocampa fasciatella* MÉN. var. *oxcellens*, agrees with the present writer in respect to the fate of the vitellophags.

The observation of K. TOYAMA (1902) on *Bombyx mori* begins from the stage of "the ventral plate". He observed the procephalic lobe extending laterally, sixteen outer segments and the neural furrow making their appearance just as in the tusser worm. The cephalic and thoracic appendages, the stomodial and proctodial depression become distinct shortly after the appearance of the neural furrow.

In 1928 L. EASTHAM worked on *Pieris* and ascertained what K. TOYAMA (1902) observed in the development process of *Bombyx*.

Incidentally the same author in 1930 published an organogenetic study of *Pieris rapae* and made many valuable observations on the development of the mesodermic somite, the nervous system, the alimentary canal, the heart, the aorta and the trachial system.

The Coleoptera have been favorite objects of investigation. W. M. WHEELER (1889) has given an excellent account of the oviposition, the development of the egg, the formation of the blastoderm, the germ layer and embryonic envelopes in his study of *Doryphora descemlineata* SAY. V. GRABER (1891) on *Hydrophilus* and H. STRINDBERG (1913) were excellent. However there was no precise observation beyond the old literatures.

Many studies have also been made to elucidate the embryology of the Diptera. During 1863 there appeared A. WEISMANN's work on *Musca*. W. NOACK (1901) has been the most recent writer on the embyology of this animal[1], giving a clear account of the fertilization, the pole-cell, the yolk cell and the formation of the blastoderm, the meso- and ento-derm.[2]

Many important observation have been contributed to the embryology of Hymenoptera. As early as 1870, O. BÜTSCHLI attempted observations on the *Apis*. His figures 17 and 18 show distinctly that there is a pair of appendages on each body segment, and he gives an account of the formation of the mesenteron[3]. O. DICKEL (1904) working on the same

1) *Calliphora erythrocephala*, *Lucilia illustris* (M.) and *Lucilia regina* (M.) were employed as his materials.

2) His account of the germ layer differentiation is confirmatory of the view of *O. Bütschli* (1883) and *R. Ritter* (1890). The gastrulation furrow remains wide open in front for a time and the anterior border to the furrow is formed by a layer from which proliferate cells which serve as anterior entoderm rudiment.

3) He stated that the mesenteron originated from the nuclei from a protoplasmic matrix and the mesenteron epithelium from the yolk cell.

material (*Apis*), says that the blostomeres arrange in two parallel rows at the early stage of the formation of the blastoderm (His figure 7).

Orthoptera have long been the objects of morphological study, as they are easily obtainable at all seasons of the year and are of very convenient size for dissection. W. PATTEN (1884) published a preliminary note on the development of *Blatta germanica* (LINN.), and reported an undoubted gastrular furrow starting posteriorly and ending in the region where the mouth will subsequently develop. According to him the groove so formed closes from behind forwardly and in this way a longitudinal mesoderm is enclosed between the ectoderm and the yolk. In his study of the embryology of *Blatta germanica*, N. A. CHOLODKOWSKY (1888, 1890) maintains that there is a distinct blastopolic groove running the length of the ventral plate. During the year 1889 W. M. WHEELER's work appeared on the embryology of *Blatta germanica* by the suggestion of W. PATTEN, containing the embryology of *Doryphora descemlineata*, carefully written with figures. He said that all the nuclei, formerly found in the yolk, probably rise to the surface to form the blastoderm and reinforce it in the formation of the blastoderm.

In short, in spite of all the works above mentioned, there has not been any work which has given a definitive account of the external change of the insect embryo.

Concerning the formation of the blastoderm most authors who worked on the other groups of insects agree with the present writer.

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Plate VII

Fig. 1a. Longitudinal section of an egg at the segmentation stage. The nuclei (n) have reached the surface at one pole. vim, vitelline membrane; pp, periplasm; y, yolk. × 25.

Fig. 1b. One segmentation nucleus. cy, cytoplasm; n, nucleus; no, nucleolus. × 460.

Fig. 1c. One yolk spherule with a vitellophag in the centre. × 460.

Fig. 2. Cross section of an egg at the blastoderm stage, in which the epithelial tissue has formed completely at one side, while at the other side it is still loose. bl, blastoderm; yc, yolk-cell. × 20.

Figs. 3, a, b. Lateral and dorsal (Fig. 3b) views of a ventral plate which is differentiated from the other part of the blastoderm. exgb, extra-garmband; vp, ventral plate. × 18.

Fig. 4. Cross section of an egg shown in the above figure, showing the growth of the amnion. amf, amnion-fold; vp, ventral plate. × 20.

Fig. 5. Cross section of an egg showing the completion of the envelopes. am, amnion; se, serous membrane. × 20.

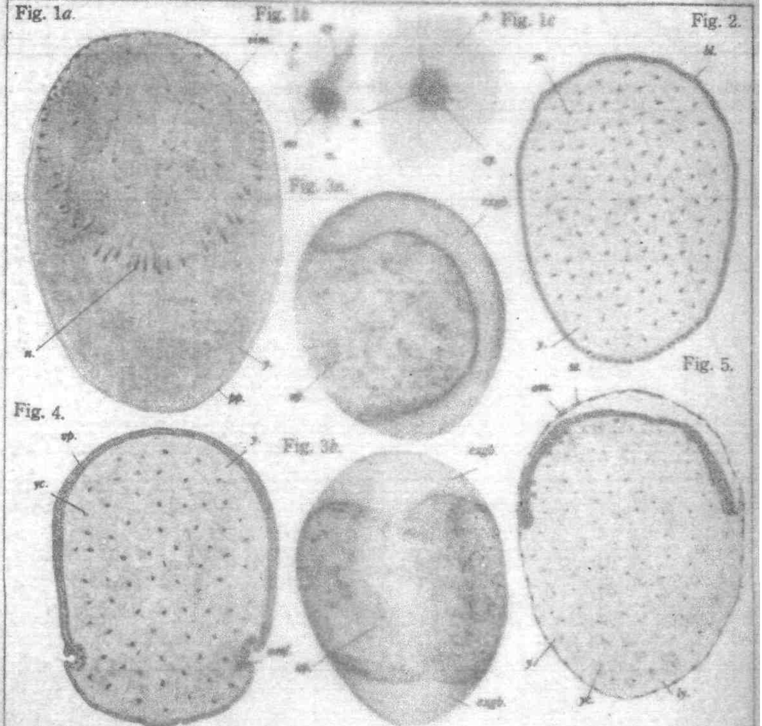
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Plate VII

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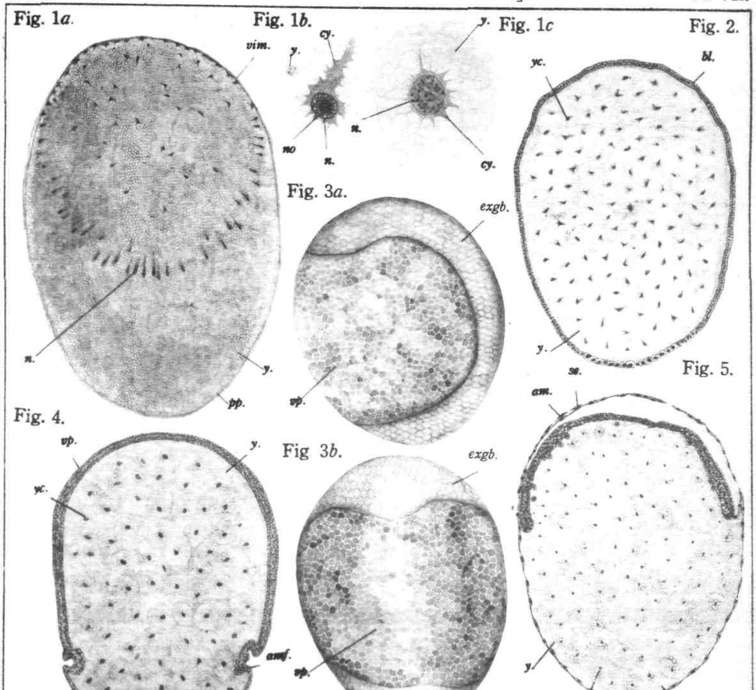
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Fig 3b.
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Plate VIII

Fig. 6. Surface view of an egg 120 hours old, the trapezoidal ventral plate which is provided with a notch (an, pn) at its upper and lower margin. × 40.

Fig. 7. Surface view of an egg 126 hours old, with a pair of globular cephalic lobes (cl) and the first traces of the primitive groove (pg), the caudal lobes (Cd) are about to appear. × 40.

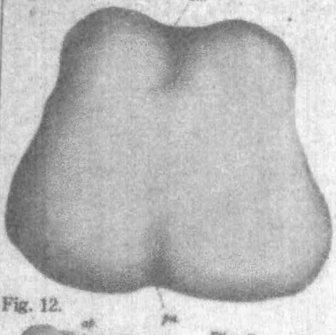
Fig. 8. Surface view of an egg 136 hours old, in which the caudal lobes (Cd) and the primitive groove (pg) have become striking; the first body segment (s^1) is marked off. us, unsegmented part. × 40.

Figs. 9–11. Surface views of the ventral plate 142 hours of age, a little further advanced than the stage of Fig. 8. The primitive groove (pg) is narrowed anteriorly, and widened posteriorly, the body segments are differentiated from the second (s^2) to the fourth (s^4). ap, anterior widening of the primitive groove. × 40.

Fig. 12. Surface of a ventral plate from an egg 160 hours old, increased in length. The primitive groove (pg) is about to close, commencing at about the second body segment. bp, blastopore. × 40.

Pl. VIII.

Fig. 6.



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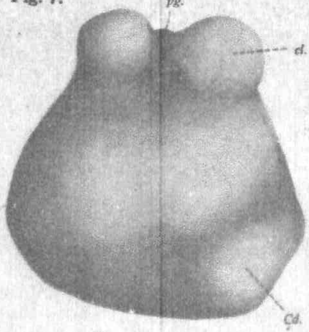

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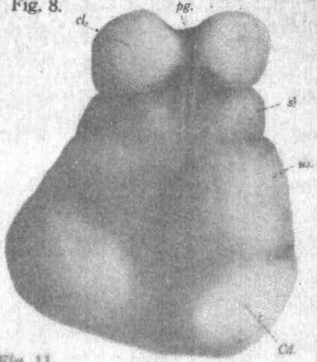

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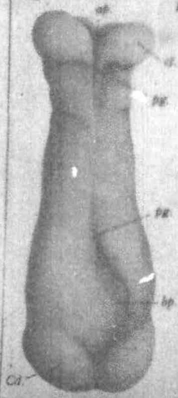

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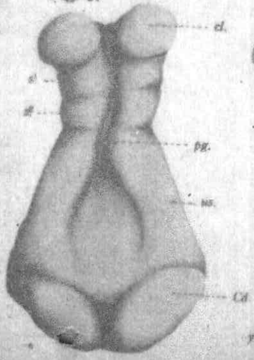

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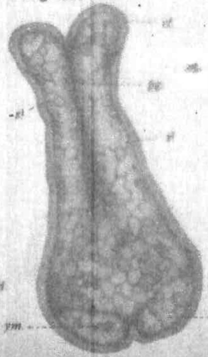

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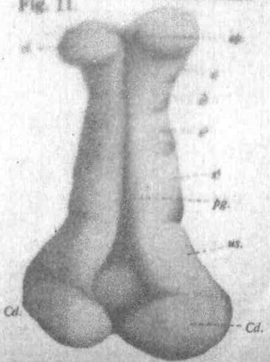

Plate VIII

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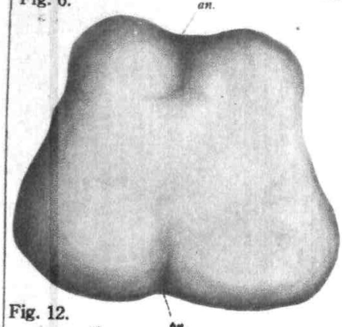

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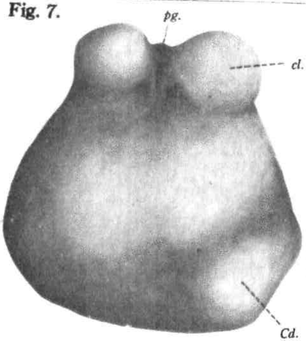

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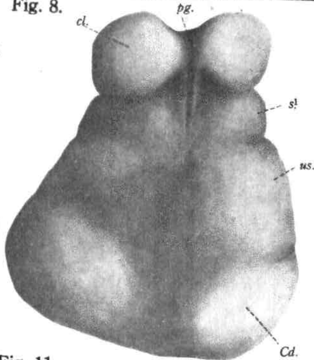

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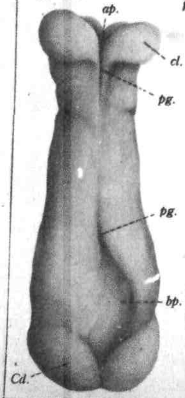

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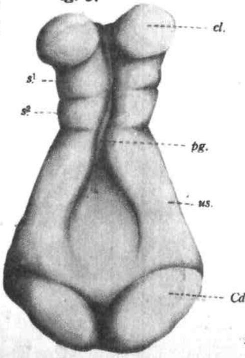

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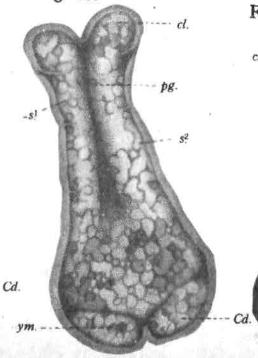

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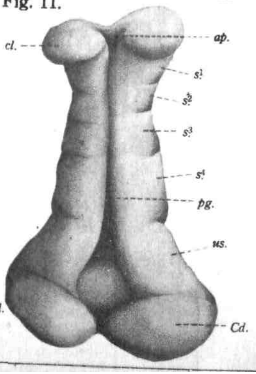


Plate IX

Figs. 13, 14. Surface views of embryo taken from eggs older than the embryo shown in Fig. 12. The body segments (s^{1-12}) are added, and the closure of the primitive groove (pg) has extended further posteriorly. × 40.

Fig. 15. Surface view of an embryo 168 hours old, in which the blastopore (bp) is about to close. The neural groove (nf) is now obvious. × 40.

Fig. 16. Surface of an embryo 176 hours old in which closure of the blastopore (bp) is almost completed. × 40.

Fig. 17. Surface view of an embryo 184 hours old in which the stomodial depression (st), cephalic (md, mx^1, mx^2), thoracic (thl^{1-3}) and anterior abdominal appendages have come into view. × 40.

Figs. 18–20. Surface views of the embryo consecutively older, the youngest (Fig. 18) is a little older than the embryo represented in Fig. 17. at, antenna; lb, labium; abl^{1-10}, abdominal appendages. × 40.

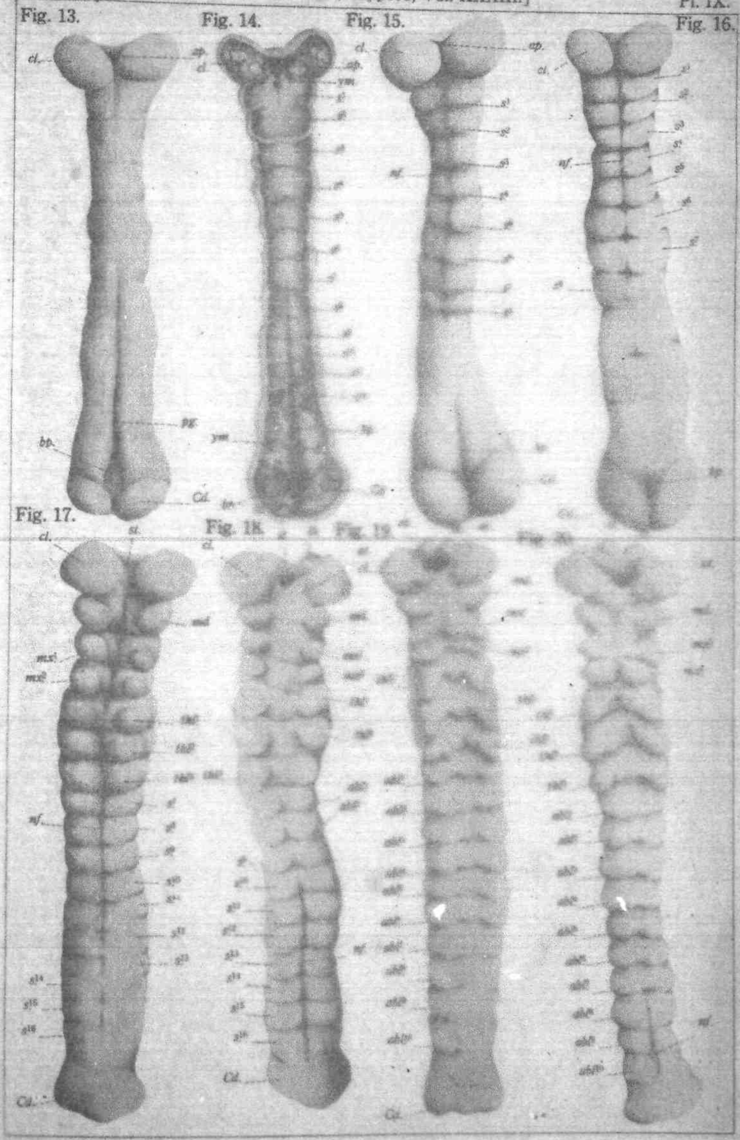


Fig. 13.
Fig. 14.
Fig. 15.
Fig. 16.
cl.
ap.
bp.
pg.
ym
Cd.
Fig. 17.
Fig. 18
Fig. 19
st.
md.
mx1
mx2
nf.

Plate IX

Figs. 13, 14. Surface views of embryo taken from eggs older than the embryo shown in Fig. 12. The body segments (s^{1-18}) are added, and the closure of the primitive groove (pg) has extended further posteriorly. × 40.

Fig. 15. Surface view of an embryo 168 hours old, in which the blastopore (bp) is about to close. The neural groove (nf) is now obvious. × 40.

Fig. 16. Surface of an embryo 176 hours old in which closure of the blastopore (bp) is almost completed. × 40.

Fig. 17. Surface view of an embryo 184 hours old in which the stomodial depression (st), cephalic (md, mx^1, mx^2), thoracic (th^{1-3}) and anterior abdominal appendages have come into view. × 40.

Figs. 18–20 Surface vi[illegible]ecutively older, the youngest (Fig. 18) is a little older than the embryo represented in Fig. 17. at, antenna; lb, labium; abl^{1-10}, abdominal appendages. × 40.

[Jour. Facul. Agr., Hokkaido Imp. Univ., Sapporo, Vol. XXXIII.]

Pl. IX.

Fig. 13.

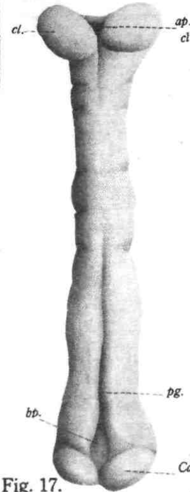


Fig. 14.

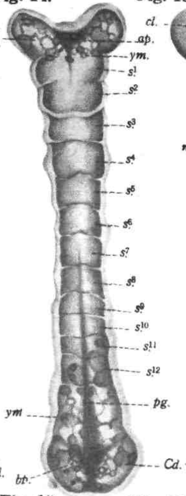


Fig. 15.

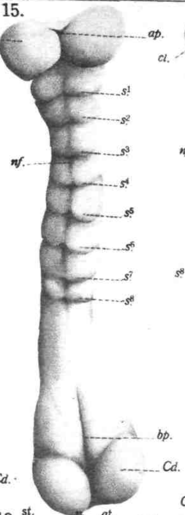


Fig. 16.

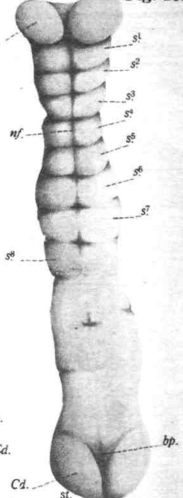


Fig. 17.

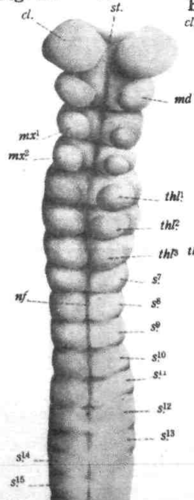


Fig. 18.

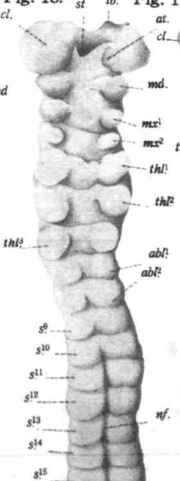


Fig. 19.

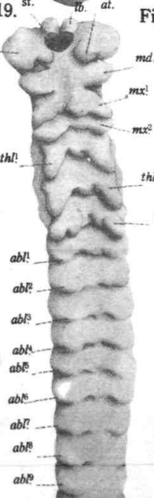


Fig. 20.

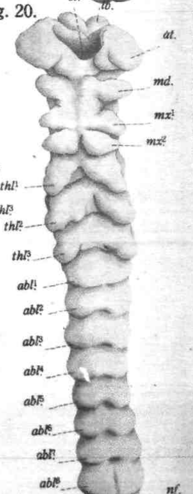


Plate X

Figs. 21, 22. Surface views of an embryo 216 hours old in which the maximum growth in body length has been attained; all segments with a pair of appendages. pr, Proctodaeum; cal, caudal limb. × 40.

Fig. 23. Surface view of an embryo 240 hours old; the diminution of the stomodial aperture (st); the abdominal appendages on the first, second, seventh to tenth segments have disappeared, while the caudal limbs (cal) appear on the caudal lobes. × 40.

Figs. 24, a, b. Surface and lateral (Fig 24b) view of an embryo 276 hours old; the body is diminished in length; and the stigmata (stg) have come into sight. amc, umbilical canal; ym, yolk-mass. × 40.

Figs. 25, a, b, c. Surface, dorsal (Fig. 25b) and lateral (Fig. 25c) views of an embryo 348 hours old; the last abdominal segment is coalesced with terminal caudal segment. × 40.

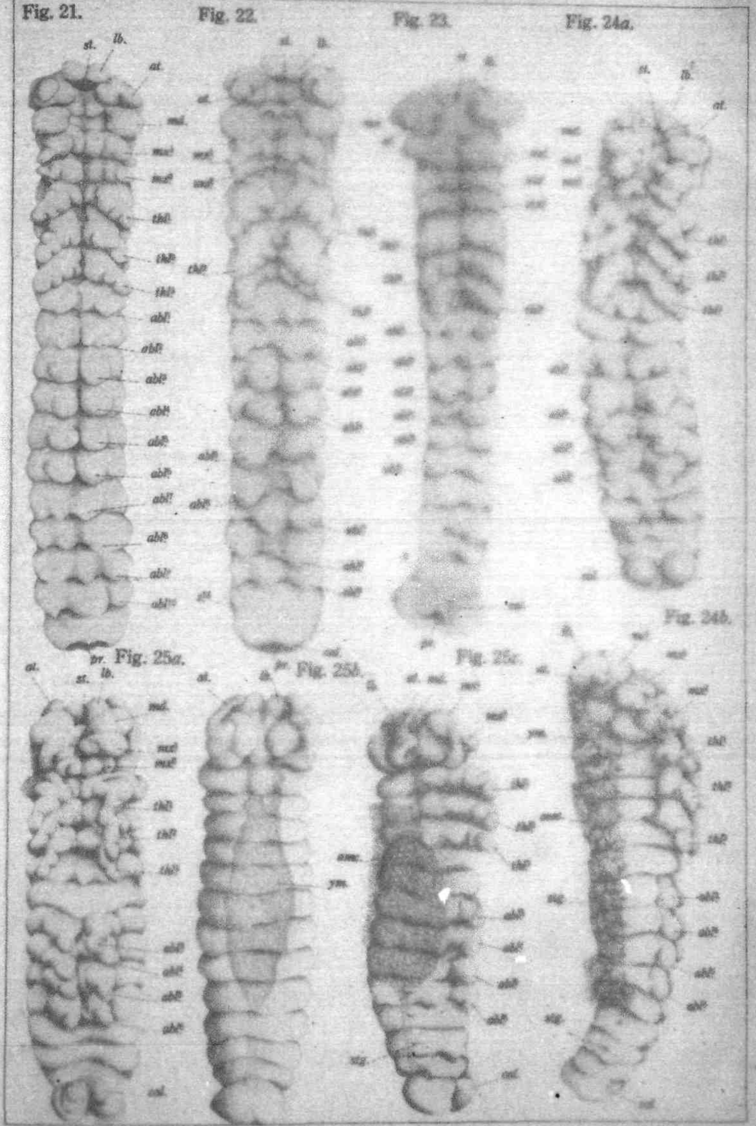


Fig. 21.
Fig. 22.
Fig. 23.
Fig. 24a.
Fig. 24b.
Fig. 25a.
Fig. 25b.
Fig. 25c.

Plate X

Figs. 21, 22. Surface views of an embryo 216 hours old in which the maximum growth in body length has been attained; all segments with a pair of appendages. pr, Proctodaeum; cal, caudal limb. × 40.

Fig. 23. Surface view of an embryo 240 hours old; the diminution of the stomodial aperture (st); the abdominal appendages on the first, second, seventh to tenth segments have disappeared, while the caudal limbs (cal) appear on the caudal lobes. × 40.

Figs. 24, a, b. Surface and lateral (Fig. 24b) view of an embryo 276 hours old; the body is diminished in length; and the stigmata (stg) have come into sight. amc, umbilical canal; ym, yolk-mass. × 40.

Figs. 25, a, b, c. Surface, dorsal (Fig. 25b) and lateral (Fig. 25c) views of an embryo 348 hours old; the last abdominal segment is coalesced with terminal caudal segment. × 40.

Fig. 21.

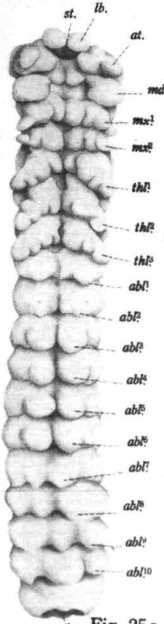


Fig. 22.

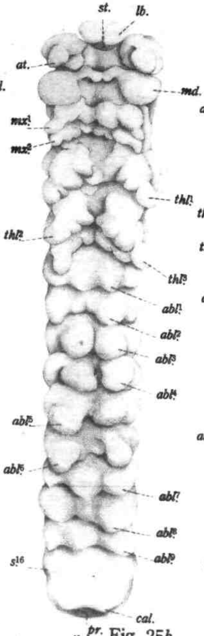


Fig. 23.

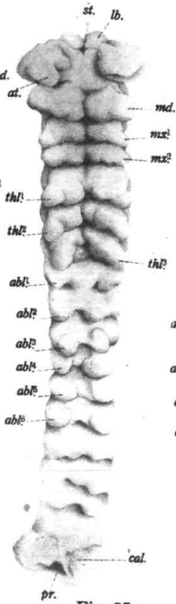


Fig. 24*a*.

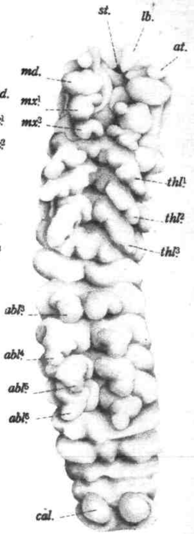


Fig. 25*a*.

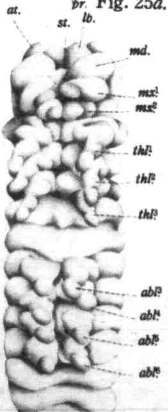


Fig. 25*b*.

Fig. 25*c*.

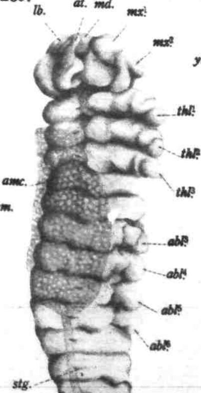


Fig. 24*b*.

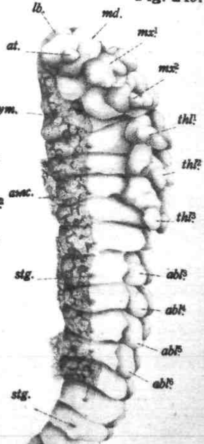


Plate XI

Figs. 26, a, b. Surface and lateral (Fig. 26b) views of an embryo at the age of 420 hours. Two hind segments are fused. × 40.

Fig. 27. Surface view of an embryo at about 20 days (526 hours) which represents the oldest stage. × 40.

Figs. 28, a, b, c. Three situations of the embryo in the revolution. × 20.

Fig. 26a.

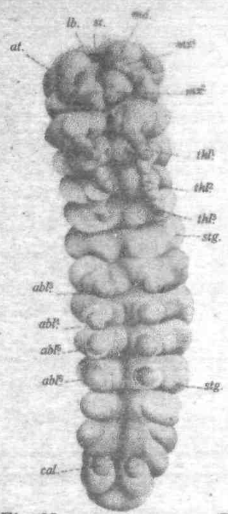


Fig. 26b.

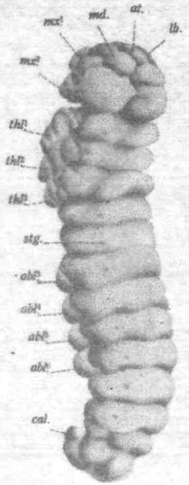


Fig. 27.

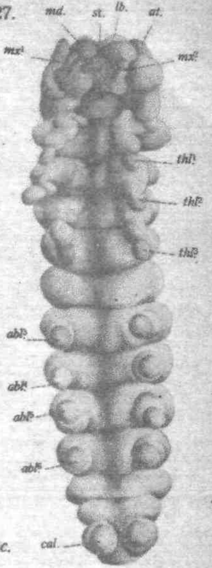


Fig. 28a.

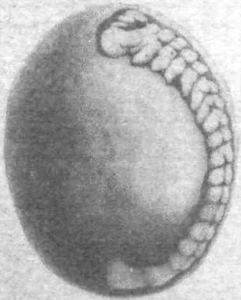


Fig. 28b.

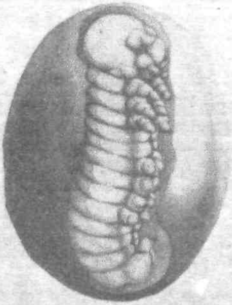
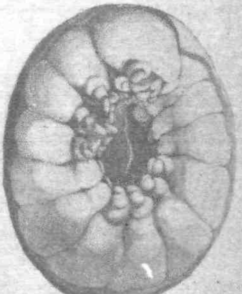


Fig. 28c.



SPIDERS FROM HOKKAIDO

By

Saburo Saito

(With four Plates)

INTRODUCTION

Since the time of the publication of the rather monumental work on the spider of Japan, "Japanische Spinnen" by W. BÖSENBERG and E. STRAND[1] dealing chiefly with the animals from Kyushu and southern parts of Honshu in 1905, that is about 30 years ago, our knowledge of Japanese Arachnology has hardly advanced. Practically the spider of Hokkaido, where the cleature abounds and where there is a particular interest in view of zoogeography, has been represented by an extremely limited number, only four very common species, *Theridion tepidariorum* C. L. KOCH, *Araneus ventricosus* (L. KOCH), *Araneus cornutus* CLERCK and *Araneus pinguis* (KARSCH)[2] having been reported inhabiting the island. With the intention of making a complete survey of spider fauna in northern Japan, the present writer has recently reported on several different occasions the spiders of Saghalien, the North and South Kuriles, and Rishiri and Rebun Islands which lie off the western coast of Hokkaido.

The collection of spiders from all localities in Hokkaido has been carried out since 1929 on a large scale by the author kindly assisted by the following gentlemen, Messrs. M. SHIRATO, S. NISHIO, M. TERUI, S. MAKINO, M. SAKAMOTO, C. CHANG, S. MOTODA, H. ITOH, G. HAYASHI, Y. OHTA, H. YAMAGUCHI, R. MATSUKI, M. L. PEELLE, Dr. TOHRU UCHIDA and Dr. T. INUKAI, to whom the author wishes to express his hearty thanks. The collection has reached a quite large number and the specimens have now been put in order for the first time for publication. They have been identified with forty known genera including sixty-one known and twenty-two new species covering fourteen families.

The system of classification adapted in the present work is a somewhat modified form of "Systema Aranearum" (Transactions of the Con-

1) W. BÖSENBERG und E. STRAND:—Japanische Spinnen, Stuttgart, 1905.

2) The locality of *Araneus ventricosus* (L. KOCH) is "Hatodate" in the original paper, but it is surely an error of the press for "Hakodate". *Araneus pinguis* (KARSCH) was collected from Nemuro or Etorof (Iterup).

[Jour. Facul. Agr., Hokkaido Imp. Univ., Sapporo, Vol. XXXIII, Pt. 5, Sept. 1934]

necticut Academy of Arts and Science, Vol. 29, 1928) after A. PETRUNKEVITCH combined with that of "Die Tierwelt Mitteleuropas" after R. BREMEN. As there has been almost no available illustration of spiders of Japan generally except for the work by W. BÖSENBERG and E. STRAND, a full description and a figure based on the mature specimen of even well known species are given as frequently as possible. All measurements are given in centimeters. The measurements for appendages are made from the proximal point of the coxae to the apical point of tarsi. In the case of eyes the measurements represent the diameter of the cornea and for the oval eyes, the longer axis is taken. The measurements of the length or width of the eye group or of the quadrangle of median eyes invariably include the eyes, but not the curvature of eye-row. Similarly the length, width and height of the carapace do not mean the curvature, but represent *an airline*.

From the present study the hitherto unexplored spider fauna of Hokkaido has become known. This has enabled the writer to enter into a general consideration of the zoogeographical relation of the island as concerned with the spider. Accordingly a comparative study of the fauna of Hokkaido with those of the adjacent territories has been carried out.

Family	Number of species recorded only from Hokkaido	Number of species found in Hokkaido and Central Japan	Number of species found in Central Japan, Hokkaido and Eurasiatic continent	Number of species found in Hokkaido and northern part of Eurasiatic continent	Number of species distributed in northern part of the New and Old Worlds	Total number of species found in Hokkaido
Oecobiidae	1	—	—	—	—	1
Thomisidae	3	3	5	—	3	14
Clubionidae	2	2	1	—	—	5
Attidae	2	1	—	2	1	6
Pholcidae	—	1	—	—	—	1
Theridiidae	3	1	—	—	1	5
Linyphiidae	1	1	—	2	2	6
Micryphantidae	1	—	—	—	—	1
Argiopidae	2	6	2	2	6	18
Tettragnathidae	2	2	—	1	1	6
Amaurobiidae	—	—	—	1	—	1
Agelenidae	2	5	—	1	—	8
Pisauridae	—	2	—	—	—	2
Lycosidae	3	1	—	4	1	9
Total	22	25	8	13	15	83

One may see that of 83 species of spiders occurring in Hokkaido 15 species are widely distributed throughout the northern circumpolar regions including the Eurasiatic and the American continents, and 13 forms are common to the former continent. Thus there are 28 species which are to be considered as northern continental forms. On the other hand 25 species belong to the southern kinds inhabiting also Japan proper. The most widely distributed species extending from Japan proper to the polar region of the continent are 8 in number, while these confined only to Hokkaido number 22. Taking into consideration the above facts, it can be seen that the spider fauna of Hokkaido is of a mixed nature including both northern and southern elements.

The Soya Strait makes the northern limit line of southern forms, while the Tsugaru Strait demarcates the southern boundary of the continental elements.

Here the utmost appreciation is offered to Dr. T. INUKAI for much valuable advice and suggestion and to Dr. TOHRU UCHIDA for his unceasing encouragement during the work.

CLASSIFICATION

In Hokkaido no species belonging to the Liphistimorphae or to the Mygalomorphae has yet been identified. Only the genus and species of the Trionycha of the Arachnomorphae are found; this is the spider in which the abdomen with a pair of spiracles leading into the booklungs, is not segmented and the chelicerae are articulated so as to move the fangs in and out.

The forms treated in this work are referred to the following families.

Key to Families of Spiders of Hokkaido

1. a. Three claws. .... 2.
   b. Two claws. .... 12.
2. a. Anal tubercle large, two-jointed, with a fringe of long hair. .... Family I. Oecobiidae
   b. Anal tubercle normal. .... 3.
3. a. Cribellum and calamistrum present at least in the female, as well as in the immature male. Eyes heterogenus, anterior median (direct) eyes alone diurnal. .... Family XI. Amaurobiidae
   b. Cribellum and calamistrum wanting. .... 4.
4. a. Fourth tarsi with a ventral row of serrated bristles forming a distinct comb. .... 5.

b. No ventral comb of serrated bristles on fourth tarsi. .... 6.

5. a. Margins of chelicerae transverse and smooth. .... Family VI. Theridiidae

b. Margins of chelicerae oblique. Promargin with three well-developed teeth. .... Family VIII. Micryphantidae

6. a. Chelicerae soldered together at base. Eyes heterogenus, direct eyes alone diurnal and the nocturnal eyes in two groups each consisting of three eyes. .... Family V. Pholcidae

b. Chelicerae free. .... 7.

7. a. Serrated bristles on tarsi present, forming at least one pair of spurious claws. .... 8.

b. Serrated bristles wanting on tarsi or at least not in the shape of spurious claws. .... 10.

8. a. External surfaces of chelicerae with stridulating ridges. .... Family VII. Linyphiidae

b. Stridulating ridges on chelicerae wanting. Orb-weavers. ...... 9.

9. a. Femora with several trichobothria arranged in a single or double row. Chelicerae without condyle. ...... Family X. Tetragnathidae

b. Chelicerae with well-developed condyle. ... Family IX. Argiopidae

10. a. Chelicerae with a distinct condyle. Anterior median eyes not far in advance of all the other eyes. Tarsal trichobothria in a regular row. .... Family XII. Agelenidae

b. Trichobothria on tarsi either in two rows or irregularly. .... 11.

11. a. Upper claws with numerous teeth in a single row. Inferior claw with two or three teeth. Legs rather long. Young spiderlings living for a while in a web. .... Family XIII. Pisauridae

b. Upper claws with few teeth. Inferior claw either smooth or with a single tooth. Legs short. Young spiderlings carried on the back of the mother's abdomen. .... Family XIV. Lycosidae

12. a. Without cribellum or calamistrum. Eight eyes in three rows, homogeneous diurnal. First row composed of four eyes, second and third of two eyes each. .... Family IV. Attidae

b. Eyes in two rows. .... 13.

13. a. All tarsi without scopula. .... Family II. Thomisidae

b. At least first and second tarsi with scopula. .... Family III. Clubionidae

Family I. *OECOBIIDAE*

Only one species of *Oecobius* belonging to this family is identified.

No form of *Uroctea* which is distributed in Honshu, has been collected in Hokkaido up to the present.

Genus **Oecobius** LUCAS, 1845

1. ***Oecobius sapporense*** n. sp. Jap. name, *Kita-chirigumo.*

Pl. XII, Fig. 1, a. Lateral view of female. b. Dorsal view of female.

Pl. XIV, Fig. 33, a. Eyegroup. b. Epigynum.

Locality: Sapporo (1 female, S. SAITO, Sept. 13, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.30	0.20	0.92	0.80	0.53	0.84

Female: Carapace 0.18 cm. long, 0.14 cm. wide between second and third coxae, with a definite cervical groove. Viewed from above, eight eyes in two rows, arranged in a circle, anterior row recurved while posterior row procurved. Lateral eyes somewhat smaller than the medians. Eyes equidistant in each row, anterior eyes separated by the diameter of median eyes and posterior eyes separated by 5/7 of the diameter of median eyes. Lateral eyes contiguous. Quadrangle wider in front than behind, more long than wide in front in ratio 5 : 4. Clypeus practically wanting. Chelicerae relatively long, widely diverging. Labium triangular, wider at base than long in ratio 3 : 2. Maxillae short. Sternum semi-circular, rounded posteriorly, with straight anterior margin, more wide than long in ratio 5 : 4. First coxae wide apart, fourth coxae separated by twice their width.

Colour in life: Carapace brown with black band on the thoracic margin. Chelicerae, lebium and mexillae dull brown. Sternum blackish brown with black fringe. Palpi and legs brown with black ring at the ends of coxae, trochanters, femora and tibiae. Abdomen hrown with two pairs of black patch at posterior part and median white markings arranged symmetrically. Sides black. Belly black with white spots.

Remarks: The present species looks very much like *Oecobius navus* (BLACKWALL), but it is readily distinguishable from the latter by the pattern of the abdomen.

Family II. *THOMISIDAE*

This family is divided into two Sub-families, Misumeninae and Philo-

drominae. As A. PETRUNKEVITCH pointed out, the Philodrominae differs from the Misumeninae in having four pairs of legs of equal length whereas the third and the fourth in the latter are much shorter than the first and the second.

I Subfamily *MISUMENINAE*

Key to Genera

1. a. Chelicerae with a band of hairs. .... 2.
   b. Chelicerae hairless. Posterior row of eyes much longer than the anterior. Abdomen high and pointed behind. ... 6. Gen. *Tmarus* SIMON
2. a. Tubercles of lateral eyes of each side apart from each other. ...... 3.
   b. Tubercles of lateral eyes of each side contiguous. .... 5.
3. a. Posterior median eyes separated as wide as the posterior median and anterior median eyes. .... 4.
   b. Posterior median eyes apart wider than the posterior median and anterior median eyes. .... 5. Gen. *Synaema* SIMON
4. a. First femur with more than five distinct spines. .... 8. Gen. *Xysticus* C. L. KOCH
   b. First femur with less than four spines. ...... 7. Gen. *Oxyptila* SIMON
5. a. Median ocular area wider than long. .... 6.
   b. Median ocular area longer than wide. .... 7.
6. a. Abdomen broadly rounded behind. .... 4. Gen. *Misumena* LATR.
   b. Abdomen truncated at the end. .... 2. Gen. *Thomisus* WALCK.
7. a. Abdomen truncated at the end. .... 3. Gen. *Pistius* SIMON
   b. Abdomen very long and slender. .... 1. Gen. *Oxytate* L. KOCH

1. Genus ***Oxytate*** L. KOCH, 1877

2. ***Oxytate setosa*** KARSCH Jap. name, *Sashige-wakabagumo*.

Pl. XII, Fig. 2, a. Dorsal view of subadult male. b. Dorsal view of female.

Pl. XIV, Fig. 34. Eyegroup of female.

Oxytate setosa, F. KARSCH:—Verhandl. d. N. V., Jahrg. 36. 1879, p. 78, Taf. 1, Fig. 11.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 247, Taf. 7, Fig. 94, Taf. 10, Fig. 175.; K. KISHIDA:—Kagakusekai (in Japanese), Tokyo, 1923.[1]

Locality: Sapporo (2 males, H. ITOH, July 22, 1930; S. YAMAGUCHI, July 20, 1931), Kitabu (1 female, B. NATORI, May 31, 1931).

Measurements:

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1) K. KISHIDA (1923) treated this species as a synonym of *Oxytate striatipes* L. KOCH.

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Sapporo)	0.96	0.59	1.49	1.49	0.92	0.92
male (Sapporo)	1.04	0.66	1.33	1.33	0.75	0.83
female (Kitabu)	0.96	0.55	0.98	0.98	0.67	0.56

Male: Carapace 0.36 cm. long, 0.28 cm. wide between second and third coxae. Thoracic groove wanting. Carapace moderately high, its sides gently sloping. All eyes situated on white tubercles. Viewed from above, both rows of eyes recurved. Anterior row strongly curved and much shorter than the posterior. Eyes of anterior row equidistant, separated from each other by about four times the diameter of anterior median eyes which are smaller than the laterals. Eyes of posterior row also equidistant, the same separation as that of anterior eyes. Quadrangle more long than wide in ratio 5 : 4. Clypeus vertical, equal to the separation of eyes. Chelicerae short, vertical, with parallel outer sides. Labium much longer than wide in ratio 2 : 1, triangular, bluntly ending anteriorly. Maxillae almost meeting in median plane. Sternum convex, with straight anterior margin, bluntly ending between the fourth coxae which are almost contiguous.

Colour in alcohol: Yellow.

Female: The fourth pair of legs relatively short as compared with that of male. Colour in life green. Carapace 0.30 cm. long.

Distribution: Japan (Honshu, Kyushu).

2. Genus ***Thomisus*** Walckenaer, 1805

3. ***Thomisus albus*** Gmelin Jap. name, *Azuchi-gumo.*

Pl. XII, Fig. 3. Dorsal view of female.

Pl. XIV, Fig. 35. Eyegroup of female.

Thomisus albus J. Blackwall:—Ann. Mag. Nat. Hist., Vol. 5, 1870, p. 398.; T. Thorell:—Südrussischer Spinnen, St. Petersburg, 1875, p. 57.; C. Chyzer et L. Kulczynski:—Araneae Hungariae, Budapest, Tom. 1. 1892, p. 82.; W. Bösenberg:—Zoologica, Stuttgart, Bd. 14, 1903, p. 339, Taf. 32, Fig. 503.; W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1905, p. 249.; R. Bremen:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 19, Taf. 2, Fig. 193.

Thomisus onustus, T. Thorell:—Rem. on Syn., Upsala, 1870–1873, p. 427.; E. Simon:—Arachn. de France, Paris, Tom. 2, 1875, p. 251.; O. Herman:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 225.

Thomisus abbreviatus, J. Blackwall:—Sp.d. Gr. Brit. & Ir., London, 1864, p. 90, pl. 4, fig. 54.

Locality: Sapporo (1 female, Y. Ohta, June 21, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.66	0.30	0.83	0.83	0.43	0.50

Female: Carapace nearly semi-circular, truncated behind, 0.23 cm. long. Cervical, radial and median furrows wanting. Eight eyes in two rows, equal in size, situated on tubercles. Viewed from above, anterior eyes arranged in a recurved row, equidistant, separated from each other by six times their diameter. Eyes of posterior row also equidistant, in a slightly recurved row. Quadrangle square-shaped, but somewhat wider than long. Lateral eyes of both rows separated from each other by four times their diameter, and situated on a tubercle on each side. Clypeus equal to length of quadrangle of median eyes. Chelicerae small, stout, with convergent outer sides. Labium triangular, as wide as long, reaching beyond middle of maxillae. Maxillae inclined over labium, wider in front than at base, meeting in front. Sternum heart-shaped, slightly longer than wide in ratio 9 : 8, bluntly ending between the almost contiguous fourth coxae. Abdomen triangular, pointed anteriorly and broadened posteriorly.

Colour in alcohol: Carapace deep yellowish brown with yellow dots. Tubercles of eyes white. Chelicerae, sternum, maxillae and labium deep brown. Palpi and first two pairs of legs deep brown with dispersed yellow dots. Third and fourth legs deep yellow, but tibiae and patellae of fourth legs brown. *Abdomen deep brown with yellow marginal stripe.* Belly brown.

Distribution: Hungary, France, Germany, England, U.S.S.R., Japan.

Remarks: This species was reported from Japan in 1892 in "Araneae Hungariae" by L. KULCZYNSKI, upon which was based the description of the same species in "Japanische Spinnen" by W. BÖSENBERG and E. STRAND.

3. Genus ***Pistius*** SIMON, 1875

4. ***Pistius truncatus*** (PALL.)

Pl. XII, *Fig.* 4. Dorsal view of female.

Pl. XIV, Fig. 36, a. Eyegroup of female. b. Epigynum.

Pistius truncatus, E. SIMON:—Arachn. de France, Paris, Tom. 2, 1875, p. 258.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 83.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 369, Taf. 10, Fig. 168, Taf. 13, Fig. 309.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 19, Taf. 2, Fig. 194, 195, Taf. 1, Fig. 196.

Tistius truncatus (*Misumena truncata*), W. BÖSENBERG :—Zoologica, Stuttgart, 1903, Bd. 14, p. 369, Taf. 34, Fig. 544.

Misumena truncata, T. THORELL :—Rem. on Syn., Upsala, 1870–1873, p. 259.; ———— :— Südrussischer Spinnen, St. Petersburg, 1875, p. 57.; O. HERMAN :—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 228.

Aranea horrida, C. FABRICIUS :—Syst. Ent., Tom. 2, 1793, p. 432.

Locality: Nopporo (1 female, S. SAITO, August 17, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.65	0.45	1.40	1.35	0.55	0.65

Female: Carapace almost circular, 0.30 cm. long. Viewed from above, anterior row of eyes strongly recurved, posterior row straight. All eyes nearly equal in size and situated on tubercles. Anterior median eyes separated from each other by three times their diameter, from anterior lateral eyes by 2.5 times their diameter. Eyes of posterior row equidistant, separated from each other by three times their diameter. Lateral eyes of both rows separated from each other by 2.5 times their diameter, and their tubercles almost contiguous. Quadrangle square-shaped, somewhat longer than wide. Clypeus equal to the separation of anterior median eyes. Chelicerae small, cone-shaped, vertical. Labium triangular, pointed in front, slightly shorter than maxillae which are inclined over the labium, almost contiguous at their ends. Sternum triangular, as long as wide, bluntly pointed between fourth coxae which are contiguous. First coxae widest apart. Abdomen triangular, 0.54 cm. wide at posterior edge which is concave. Anterior edge straight, 0.30 cm. wide.

Colour in life: Carapace brownish sepia with dispersive yellow dots and a deep sepia patch at posterior part. Chelicerae and sternum brownish sepia. Maxillae and labium paler than chelicerae. First two pairs of legs deep sepia with yellow dots and yellow tarsi and metatarsi. Third and fourth pairs of legs deep yellow, and patellae and tibiae of fourth legs deep sepia with yellow dots. Abdomen brownish sepia with several yellow marginal lines. Belly the same as above in colour.

Distribution: Hungary, France, Germany, U.S.S.R., Japan (Honshu, Kyushu).

4. Genus ***Misumena*** LATR., 1804

5. ***Misumena tricuspidata*** (FABRICIUS) Jap. name, *Hana-gumo*.

Pl. XIV, Fig. 37, a. Eyegroup of female. b. Epigynum. c, d. Palpus of male.

Misumena tricuspidata, E. SIMON:—Arachn. de France, Paris, Tom. 2, 1875, p. 244.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest. Tom. 1, 1892, p. 84.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 365, Taf. 34, Fig. 538.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 254, Taf. 10, Fig. 169, 170.; R. BREMEN:—*Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 20, Taf. 1, Fig. 198.*

Diaea tricuspidata, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 539.; ———:—Südrussischer Spinnen, St. Petersburg, 1875, p. 56.

Diaea capparina, O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 232.

Aranea tricuspidata, C. FABRICIUS:—Syst. Ent., Tom. 2, 1793, p. 433.

Locality: Yakumo (2 females, S. SAITO, July 24, 1931.; K. MATSUKI, Oct. 24, 1931). Vicinity of Sapporo (4 females, H. YAMAGUCHI, Aug., 1929.; H. ITOH, July 6, 1930.; S. YAMAGUCHI, July 10, 1931). Makomanai (1 male, 1 female, S. SAITO, Sept. 18, 1932). Sapporo (1 male, Dr. T. UCHIDA, Aug. 30, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Yakumo)	0.55	0.49	1.13	1.13	0.55	0.63
female (Yakumo)	0.46	0.36	0.81	0.81	0.51	0.59
female (Sapporo)	0.61	0.43	0.76	0.76	0.47	0.48
female (Sapporo)	0.50	0.43	0.93	0.93	0.51	0.55
female (Sapporo)	0.44	0.27	0.89	0.89	0.48	0.51
female (Sapporo)	0.60	0.40	1.00	0.93	0.50	0.43
female (Makomanai)	0.50	0.35	0.90	0.90	0.45	0.50
male (Makomanai)	0.35	0.20	0.70	0.70	0.30	0.35
male (Sapporo)	0.30	0.20	0.75	0.75	0.30	0.30

Female: Carapace 0.20 cm. long, 0.18 cm. wide between second and third coxae. All eyes equal in size and situated on tubercles. Viewed from above, both rows recurved. Anterior row of eyes strongly recurved, the eyes being equidistant, separated from each other by three times their diameter. Posterior median eyes separated from each other by five times their diameter and from posterior lateral eyes by three times their diameter. Lateral eyes of both rows separated by three times their diameter, their tubercles contiguous. Quadrangle trapezoidal, wider behind than in front in ratio 5 : 3, somewhat wider than long. Clypeus equal to separation of anterior eyes. Chelicerae small, vertical, its outer edges parallel. Labium triangular, more long than wide, reaching considerably beyond middle of maxillae. Maxillae much wider in front than at base. Sternum shield-shaped, as wide as long, truncated in front, bluntly ending between fourth

coxae which are nearly contiguous. Abdomen pear-shaped, with broad, flat end.

Colour in life: It matches very perfectly to the resorts, flowers in most cases, and is white when living on white flowers and yellow on yellow ones. Specimen on white flower; carapace pale greenish yellow. Legs, palpi, chelicerae, maxillae, labium and sternum green. Abdomen white with a sepia marking.

Male: Colour clearer than that of female. Carapace pale brown with a pair of black stripes and marginal line. Legs brownish black. Abdomen deep green with a median black marking.

Distribution: Japan (Honshu, Kyushu), Germany, France, Hungary, U. S. S. R.

5. Genus ***Synaema*** SIMON, 1864

6. ***Synaema globosa japonica*** KARSCH Jap. name, *Funoji-gumo.*

Pl. XII, Fig. 5. Dorsal view of female.

Pl. XIV, Fig. 38. Tarsal claw.

Synaema globosa japonica, S. YUHARA:—Study of Spiders (in Japanese). Tokyo, 1930, p. 185, Fig. 102.; T. KAMBE:—Jour. Chosen Nat. Hist. Soc. (in Japanese), Keijo, 1933, p. 44.
Synaema japonica, F. KARSCH:—Verhandl. d. N. V., Jahrg. 36, 1879, p. 75, Taf. 1, Fig. 10.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 265, Taf. 10, Fig. 165.

Locality: Vicinity of Sapporo (1 female, S. SAITO, July 6, 1930).
Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.45	0.30	0.50	0.50	0.30	0.35

Female: Carapace smooth, almost circular, 0.19 cm. long. Cervical, radial and median furrows wanting. Eyes of anterior row equidistant, arranged in a recurved row, separated from each other by six times the diameter of anterior median eyes which are much smaller than the laterals in ratio 3 : 1. Posterior row of eyes more strongly recurved than the anterior, equal in length with the anterior. The median eyes of posterior row separated from each other by ten times their diameter, from posterior lateral eyes by three times their diameter. Lateral eyes of both rows separated by their diameter, and their tubercles subcontiguous. Quadrangle trapezoidal, wider behind than in front in ratio 5 : 3, more wide than long in ratio 16 : 9. Clypeus equal to 1.5 times the diameter of anterior median

eyes. Chelicerae small, vertical, cone-shaped. Labium triangular, slightly longer than wide. Maxillae parallel, wider in front than at base. Sternum rhombic-shaped, bluntly ending posteriorly between fourth coxae which are almost contiguous.

Colour in life: Carapace deep brown with yellow ocular tubercles. Chelicerae, labium and maxillae brown. Sternum black. Palpi, third and fourth legs yellow. First two pairs of legs brownish yellow with black coxae, trochanters and femora. Abdomen yellow with a characteristic black marking. Belly black. Spinnerets brown.

Remarks: Because of the difference of the belly is uniformly brownish black this species was described as a new species by F. KARSCH who distinguished it from the European species, *Synaema globosa* (FABR.) which has a blackish brown median band on the pale brown belly.

Distribution: Japan (Honshu, Kyushu, Chosen).

6. Genus *Tmarus* SIMON, 1875

7. *Tmarus piger* WALCKENAER

Pl. XII, Fig. 6, a. Dorsal view of female. b. Sideview of abdomen.
Pl. XIV, Fig. 39. Eyegroup.

Tmarus piger, E. SIMON:—Arachn. de France, Paris, Tom. 2, 1875, p. 262.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 101, Tab. 5, fig. 10.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 248.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 20, Taf. 2, Fig. 207, Taf. 1, Fig. 208.

Tmarus piger (*Monaeses cuneolus* C. L. K., BERTK.), W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 370, Taf. 34, Fig. 505.

Monaeses cuneolus, O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 224.

Locality: Vicinity of Sapporo (1 male, S. SAITO, April 30, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	0.40	0.30	0.60	0.60	0.30	0.30

Male: Carapace nearly circular, 0.15 cm. long. Viewed from above, anterior row of eyes straight by anterior edges, posterior row slightly recurved by anterior sides and much longer than the anterior row in ratio 3 : 2. Anterior eyes smaller than the corresponding eyes of the posterior row and median eyes smaller than the laterals in both rows. Eye-ratio 6 : 4 : 3 : 2. Anterior median eyes separated from each other by three times their diameter, from anterior lateral eyes by four times their diameter.

Posterior median eyes separated from each other by four times their diameter, from posterior lateral eyes by five times their diameter. Lateral eyes of both rows separated by the same distance as that between the posterior median and lateral eyes. Quadrangle rectangular, wider behind than in front in ratio 18 : 11, as long as wide. Clypeus equal to the separation of two median eyes of posterior row, with five vigorous bristles at anterior margin. Chelicerae small, vertical, cone-shaped. Labium lengthened triangular in shape, bluntly ending anteriorly, reaching beyond middle of maxillae. Maxillae inclined over labium, almost meeting in median plane. Sternum shield-shaped, convex, bluntly pointed posteriorly, with straight anterior margin. First coxae wide apart, fourth coxae separated by their width. Abdomen high and pointed behind.

Colour in life: Carapace white with brown and black dots scattered at the marginal part. Chelicerae yellow. Maxillae, labium, palpi and legs yellow. Sternum black. Abdomen pale violet with a median pale band and four transverse pale stripes. Belly pale yellow with a median black band.

Distribution: Germany, France, Hungary, Japan (Kyushu).

7. Genus ***Oxyptila*** SIMON, 1864

8. ***Oxyptila nigrifrons*** n. sp. Jap. name, *Kuro-hanagumo-modoki.*

Pl. XII, Fig. 7. Dorsal view of male.

Pl. XIV, Fig. 40, a. Eyegroup. b, c. Palpus of male.

Locality: Soranuma (1 male, S. MAKINO, Sept. 8, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	0.34	0.20	0.50	0.50	0.34	0.34

Male: Carapace almost circular, 0.14 cm. long. Viewed from above, two rows of eyes recurved, nearly equal in length. Anterior row less curved than posterior row, and its eyes equidistant, separated from each other by 2.5 times the diameter of the anterior median eyes which are smaller than the anterior laterals in ratio 2 : 1. Posterior median eyes equal to anterior median eyes in size, separated from each other by 2.5 times their diameter, and from posterior lateral eyes by three times their diameter. Distance between both laterals equal to the distance between the median and lateral eyes in posterior row. Clypeus equal to three times

the diameter of anterior median eyes. Chelicerae vertical, short, weak, with convergent outer edges. Labium longer than wide, with almost parallel sides, reaching beyond middle of maxillae. Maxillae parallel, with concave outer edges. Sternum flat, heart-shaped, bluntly ending between fourth coxae. The space between the second coxae largest.

Colour in alcohol: Carapace black. Chelicerae of the same colour as the carapace, with brown fang. Maxillae and labium pale black. Sternum dull yellow with black margin. Palpi and legs yellow. Abdomen dull black with a deep black marking at anterior part. Belly dull yellow with dispersive black fleck.

Remarks: The present species is almost identical with *Oxyptila decorata* KARSCH in Honshu (Japan), however, the colour of cephalothorax and abdomen in the present specimen is black and there is no bright colour in the case of the species of Honshu.

8. ***Xysticus*** C. L. Koch, 1835

9. ***Xysticus sapporensis*** n. sp. Jap. name, *Ezo-kanigumo.*

Pl. XII, Fig. 8. Dorsal view of female.

Pl. XIV, Fig. 41. Frontview of eyegroup.

Locality: Sapporo (1 female, S. SAITO, June 5, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.45	0.30	0.60	0.60	0.40	0.40

Female: Carapace 0.20 cm. long, 0.15 cm. wide between second and third coxae. Cervical, radial and median furrows wanting. Arrangement of eyes typical. Lateral eyes larger than median eyes in ratio 3 : 2. Viewed from above, anterior eyes arranged recurvely, equidistant, separated from each other by four times the diameter of anterior median eyes. Posterior row much longer than anterior, recurved, its eyes equidistant, separated from each other by five times the diameter of posterior median eyes. Laterals separated by 12/5 of their diameter. Quadrangle wider behind than in front in ratio 5 : 4, as long as wide. Clypeus vertical, equal to the width of quadrangle of median eyes. Chelicerae short, weak, cone-shaped. Sternum heart-shaped, convex, with straight truncature in front, pointed behind. First coxae far apart, fourth coxae contiguous.

Colour in life: Carapace dark brown with a broad submarginal black

band which extends anteriorly to the space between the posterior median and lateral eyes. Chelicerae brownish yellow. Maxillae and labium dull yellow, the latter with a brown marginal stripe. Leg dull yellow with a brown annulation at the end of tibia. Abdomen of about the same colour as legs, with a brownish black marking at median part.

Remarks: This species bears a resemblance in appearance to *Xysticus pini* (HAHN) which is distributed in Asia and Europe, but the marking of abdomen makes it a distinct species.

10. ***Xysticus tunicatus*** BÖS. et STRAND

Pl. XIV, Fig. 42. Epigynum.

Xysticus tunicatus, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 263, Taf. 10, Fig. 176.

Locality: Sapporo (1 female, Y. OHTA, June 21, 1931). Vicinity of Sapporo (1 female, S. YAMAGUCHI, July 10, 1931). Lake Akan (1 male, S. MOTODA, July 31, 1931). Mt. Akan (1 female, Dr. T. INUKAI, August, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Sapporo)	0.70	0.50	0.80	0.80	0.60	0.60
female (Sapporo)	0.70	0.50	0.80	0.80	0.60	0.60
female (Mt. Akan)	0.85	0.60	1.30	1.30	0.90	1.00
male (Lake Akan)	0.47	0.28	0.95	0.95	0.71	0.76

Female: Carapace 0.30 cm. long, 0.28 cm. wide between second and third coxae. Viewed from above, both rows of eyes recurved, almost parallel. Anterior row slightly shorter than the posterior. Four median eyes equal in size, smaller than the laterals, and posterior lateral eyes larger than the anterior lateral ones. Eye-ratio 6 : 3 : 2. Anterior median eyes separated from each other by seven times their diameter, from the laterals by four times their diameter. Posterior median eyes separated from each other by the same distance as that between anterior median eyes. Quadrangle nearly quadrate-shaped, but slightly more long than wide. Clypeus equal to the width of quadrangle of median eyes. Chelicerae of moderate size, with convergent outer sides, furnished with long black hairs. Labium oval, rounded anteriorly. Maxillae very little dilated at end. Sternum heart-shaped, flat, truncated in front, pointed between the fourth coxae which are separated by 1/2 of their width.

Colour in alcohol: Carapace pale brown with a deep blackish brown

marginal band. Chelicerae brown. Maxillae and labium blackish brown with pale ends. Sternum pale brown with deep brown fleck. Palpi, first and second legs brown, third and fourth legs pale brown with deep brown dots. Abdomen dull brown with two pairs of pale bands at posterior part. Belly pale brown with dull brown fleck.

Male: Colouration clearer than that of female, the brown marginal band of carapace broader than that of female. Tarsi and metatarsi of legs yellow.

Distribution: Japan (Kyushu).

11. ***Xysticus ephippiatus*** SIMON

Xysticus ephippiatus, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 261, Taf. 10, Fig. 119, 161.

Locality: Vicinity of Sapporo (1 female, S. SAITO, Sept. 21, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.77	0.51	1.03	1.03	0.72	0.78

Female: Carapace 0.40 cm. long, 0.35 cm. wide between second and third coxae, highest just behind eye region, sloping gently forward and backward. Both rows of eyes recurved, posterior row slightly longer than the anterior. Eyes of anterior row equidistant, separated from each other by four times the diameter of anterior median eyes. Posterior eyes also equidistant and their separation equal to that of the anterior eyes. Lateral eyes of both rows larger than the median eyes and separated by their diameter. Quadrangle rectangular, as wide as long. Clypeus equal to the length of quadrangle of median eyes, with several vigorous black bristles on the anterior margin. Chelicerae short, furnished with short, black hairs. Labium triangular, more long than wide at base in ratio 2 : 1, pointed anteriorly. Maxillae with parallel outer edges, inclined over labium, with rounded ends. Sternum oval, convex, more long than wide in ratio 3 : 2, bluntly pointed in front of hind coxae which are almost contiguous.

Colour in life: Carapace pale brownish yellow with a pair of deep brown bands. Chelicerae, labium, maxillae, sternum, palpi and legs pale brownish yellow with dispersive deep brown dots. Abdomen of the same colour with carapace, with a deep brown leaf-marking. Belly pale brownish yellow.

Distribution: Japan (Kyushu).

II Subfamily *PHILODROMINAE*

Two genera of Hokkaido may be diagnosed as follows.

a. Posterior eyes arranged in a slightly recurved line with the median eyes farther from each other than from the lateral eyes. .... 1. Gen. *Philodromus* WALCKENAER

b. Posterior eyes arranged in a strongly recurved line and equidistant. ... . 2. Gen. *Tibellus* SIMON

1. Genus ***Philodromus*** WALCKENAER, 1825

12. ***Philodromus flavidus*** n. sp. Jap. name, *Ki-ebigumo*.

Pl. XII, Fig. 9. Dorsal view of female.

Pl. XIV, Fig. 43, a. Eyegroup. b. Chelicera. c. Epigynum.

Locality: Mt. Akan (1 female, Dr. T. INUKAI, July, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.80	0.70	0.85	1.00	0.80	0.75

Female: Carapace 0.29 cm. long, 0.22 cm. wide between second and third coxae, with a definite cervical groove. Viewed from above, anterior row of eyes recurved, posterior row almost straight but slightly recurved, and much longer than the anterior. Posterior eyes somewhat larger than the anterior eyes. Anterior median eyes separated from each other by two times their diameter, from anterior lateral eyes by their diameter. Posterior median eyes separated from each other by almost four times their diameter, from posterior lateral eyes by 1.5 times their diameter. The separation of the lateral eyes of both rows equal to the distance between the posterior median and lateral eyes. Quadrangle trapezoid in shape, wider behind than in front in ratio 31 : 19, more wide than long in ratio 3 : 2. Clypeus equal to length of anterior row of eyes. Chelicerae short, weak, vertical, with a tooth on the anterior margin of claw-furrow. Labium triangular, rounded anteriorly, more wide than long in ratio 4 : 3, reaching beyond middle of maxillae. Maxillae nearly square, wider at base than in front. Sternum heart-shaped, strongly rebordered, as wide as long with concave anterior margin, bluntly ending between fourth coxae which are separated by two times their width.

Colour in alcohol: Pars cephalica light brown, with deep brown markings at eye-region. Pars thoracica dark violet with deep brown along

the cervical and radial grooves. Chelicerae brown. Maxillae, labium and sternum light brown. Palpi and legs above yellow with dark longitudinal stripe, under side light brown, without marking. Abdomen yellow with four deep muscular points at the anterior part, and six brown muscular points at the posterior part and a pair of brown markings on both sides of the broadest part. Belly light brown.

Remarks: This species bears some resemblance to *Philodromus emarginatus* (SCHRUNK) in the form of epigynum, but the colour of the spider and the number of spines on the tibia of the first leg make it a distinct species.

13. *Philodromus rufus* WALCKENAER

Philodromus rufus, E. SIMON:—Arachn. de France, Paris, 1875, Tom. 2, p. 287, pl. 8, Fig. 9.; E. KEYSERLING:—Spinnen Amerikas, Laterigradae, Nürnberg, 1880, p. 217, pl. 5, Fig. 119.; N. BANKS:—Proc. Acad. Philadelphia, 1892, p. 64, pl. 3, Fig. 26.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1891, p. 107, Tab. 4, Fig. 16.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 333, Taf. 31, Fig. 494.; A. PETRUNKEVITCH:—Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 421.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 27, 29, Taf. 3, Fig. 285, Taf. 4, Fig. 306.; S. SAITO:—Transact. Sapporo Nat. Hist., Bd. 13, 1934, p. 327.

Philodromus obscurus, J. BLACKWALL:—Ann. Mag. Nat. Hist., 4 ser., 1871, Vol. 8, p. 431.

Philodromus pictus, J. H. EMERTON:—Trans. Connecticut Acad. Sc., 1892, Vol. 8, p. 373, pl. 31, Fig. 2.; ——— :—Common Spiders, 1902, p. 37, Fig. 108–110.

Locality: Shiranuka (1 female, M. L. PEELLE, July 31, 1931). Kussharo (1 female, S. NISHIO, July 15–18, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Shiranuka)	0.50	0.35	0.55	0.60	0.40	0.40
female (Kussharo)	0.60	0.50	0.75	0.90	0.70	0.70

Female: Carapace 0.15 cm. long, 0.11 cm. wide between second and third coxae. Cervical, radial and median furrows wanting. Viewed from above, both rows of eyes recurved. Posterior row much longer than the anterior and more curved. All eyes situated on white tubercles. Anterior lateral eyes largest, and median eyes of both rows smallest. Eye-ratio 10 : 5 : 3. Anterior median eyes separated from each other by four times their diameter, from anterior lateral eyes by their diameter. Posterior median eyes separated from each other by eight times their diameter, from posterior laterals by four times thier diameter. Laterals separated by three times the diameter of anterior lateral eyes. Quadrangle wider behind than in front in ratio 2 : 1, slightly more wide than long. Clypeus vertical,

equal to the separation of anterior median eyes. Chelicerae weak, cone-shaped. Labium longer than wide, rounded anteriorly, reaching middle of maxillae. Maxillae inclined over labium, with convex outer sides. Sternum heart-shaped, more long than wide in ratio 4 : 3. First coxae wide apart, fourth coxae separated by a distance equal to their width.

Colour in alcohol: Carapace dull yellow with a marginal black band. Ocular tubercles white. Legs pale yellow with black dots on femora, and with indications of dark colour on tibiae, metatarsi and tarsi. Chelicerae, maxillae and labium dull yellow. Sternum deep yellow with black marginal markings. Abdomen pale yellow with pale sepia median and black marginal markings and black dots. Belly pale yellow with black markings at the circumference of spinnerets which are deep yellow.

Distribution: U.S.A., Canada, France, Germany, Hungary, Japan (Southern Saghalien).

14. *Philodromus aureolus* CLERCK

Philodromus aureolus, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 99, pl. 5, Fig. 59.; T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 264.; ———:—Südruss'scher Spinnen, St. Petersburg, 1875, p. 59.; E. SIMON:—Arachn. de France, Paris, 1875, Tom. 2, p. 296.; T. THORELL:—Bull. Survey, Vol. 3, 1877, p. 500.; O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 218.; E. KEYSERLING:—Spinnen Amerikas, Nürnberg, Laterigradae, 1880, p. 217.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 108.; E. STRAND:—Zool. Anz., Bd. 32, 1908, p. 216.; A. PETRUNKEVITCH:—Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 418.; H. ZIMMERMANN:—Spind. Umgegend von Niesky, p. 119.

Philodromus cespiticolis, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 95, pl. 5, Fig. 58.

Locality: Sapporo (1 male, S. SAITO, July 23, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	0.60	0.40	1.40	1.40	1.10	1.00

Male: Carapace 0.25 cm. long, 0.20 cm. wide between second and third coxae. Eyes in two rows situated on tubercles. Anterior row of eyes recurved. Posterior row nearly straight, much longer than the anterior row. Anterior median eyes separated from each other by two times their diameter, from anterior lateral eyes by their diameter. Posterior median eyes separated from each other by three times their diameter, from posterior lateral eyes by about two times their diameter. Quadrangle wider behind than in front in ratio 3 : 2. Clypeus equal to the separation of two posterior median eyes. Chelicerae short, vertical, weak, with parallel

outer edges. Labium triangular, pointed anteriorly, as long as wide. Maxillae parallel, with concave outer edges, dilated at end. Sternum heart-shaped, convex, bluntly pointed between fourth coxae. The space between second coxae most broad. Fourth coxae separated by their width.

Colour in life: Carapace reddish brown with a white median band, and clypeus paler. Chelicerae and palpi green. Sternum, maxillae and labium brownish yellow. Legs green, but patellae, tibiae, metatarsi and tarsi brownish yellow. Abdomen yellowish white with black margin and dispersive black points. Belly white.

Remarks: This species is full variability, and the so-called "*aureolus* group" contains several varieties or forms as the following; R. BREMEN recognized four subspecies, *Philodromus aureolus rufolimbatus* KULCZ., *Ph. a. aureolus* (OLIV.), *Ph. a. caespiticola* (WALCK.) and *Ph. a. similis* (KULCZ.) from Europe in his work "Tierwelt Mitteleuropas". W. BÖSENBERG admitted another subspecies *Ph. a. verus* KULCZ. from Europe (Zoologica, Bd. 14). W. BÖSENBERG and E. STRAND described one subspecies *Ph. a. japonicola* and moreover they collected a new species in the *aureolus*-group, *Ph. subaureolus* in their "Japanische Spinnen". T. THORELL had stated in "Remarks on Synonyms of European Spiders" that the male of this species is recognizable in substantially two forms which are treated by J. BLACKWALL (Spid. Gr. Brit. & Ir., 1864) as two different species, *Ph. aureolus* and *Ph. cespiticolis* because of the inferior process of the tibial joint, but transition-forms between the two appear in the detailed study. And the females of these *Ph. aureolus* and *Ph. cespiticolis* are quite impossible to distinguish. Therefore he came to the conclusion that they are not specifically different. C. CHYZER and L. KULCZYNSKI described seven subspecies *Ph. a. verus* KULCZ., *Ph. a. variegatus* KULCZ., *Ph. a. caespiticola* WALCK., *Ph. a. similis* KULCZ., *Ph. a. pallens* KULCZ., *Ph. a. rufolimbatus* KULCZ. and *Ph. a. marmoratus* KULCZ. from Hungary (Araneae Hungariae, 1892).

Distribution: U.S.A., U.S.S.R., Sweden, Germany, France, England, Hungary.

2. Genus *Tibellus* SIMON, 1875

15. *Tibellus oblongus* WALCKENAER

Pl. XIV, Fig. 44. Eyegroup.

Tibellus oblongus, E. SIMON:—Arachn. de France, Paris, Tom. 2, 1875, p. 311.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 115.; E. STRAND:—Zool. Anz., Bd. 32, 1908, p. 241.; J. H. ALLEN:—Bull. Amer. Mus. Nat. Hist., 1911, Vol. 29, p. 432.; C. R. CROSBY and S. C. BISHOP:—Memoir Cornell Univ. Agr. Exper. Station, New York, 1926, p. 1060.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig,

Bd. 3, Lief. 2, p. 30, Taf. 5, Fig. 324, 325.; S. SAITO:—Jour. Fac. Sc. Hokkaido Imp. Univ., Ser. 4, Zoology, Vol. 2, 1933, p. 115, Fig. 5.

Tibellus oblongus (*Philodromus*), G. MARK:—Proc. Nat. Mus., Washington, Vol. 12, 1889, p. 558.

Tibellus oblongus (*Thanatus*), W. BÖSENBERG:—Zoologica, Bd. 14, 1903, Stuttgart, p. 338, Taf. 32, Fig. 502.

Tibellus duttonii, J. H. EMERTON:—Common Spiders, Boston, 1902, p. 39, Fig. 114–116.; J. H. COMSTOCK:—Spider Book, New York, 1913, p. 549, Fig. 620.

Tibellus duttoni, E. KEYSERLING:—Spinnen Amerikas, Nürnberg, Laterigradae, 1880, p. 194, pl. 4, Fig. 107.; N. BANKS:—Proc. U.S. Nat. Mus., Vol. 25, 1903, p. 216.; ———:— Bull Smithsonian Inst. U.S. Nat. Mus., Washington, Vol. 72, 1910, p. 51.

Philodromus oblongus, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 100, pl. 5, Fig. 60.; T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 269.

Thanatus oblongus, H. ZIMMERMANN:—Die Spinnen Umgegend von Niesky, p. 116.; T. THORELL:—Südrussischer Spinnen, St. Petersburg, 1875, p. 60.

Thomisus Duttonii, N. M. HENTZ:—Spid. U. S., Boston, 1875, p. 81, pl. 10, Fig. 10, pl. 18, Fig. 79, pl. 20, Fig. 11.

Locality: Sapporo (1 female, S. SAITO, Sept. 14, 1929). Vicinity of Sapporo (1 immature female, S. SAITO, Apr. 23, 1930). Shiranuka (1 male, M. L. PEELLE, July 31, 1931). Mt. Yubari (1 female, S. MOTODA, July 9, 1932). Mt. Daisetsu (1 female, S. NISHIO, August 1–5, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Shiranuka)	0.70	0.45	1.25	1.50	1.00	1.35
female (Sapporo)	0.60	0.40	0.60	0.80	0.50	0.70
female (Mt. Yubari)	1.00	0.70	1.30	1.60	1.00	1.40
female (Mt. Daisetsu)	1.50	1.10	1.60	1.90	1.20	1.50

Female: Carapace 0.50 cm. long, 0.30 cm. wide between second and third coxae. Cervical, radial and median furrows wanting. Five long, stout spines on carapace. Both rows of eyes strongly recurved, and lateral eyes of both rows larger than the medians in ratio 3 : 1. Anterior median eyes separated from each other by three times their diameter, from the laterals by 1.5 times their diameter. Posterior median eyes separated from each other by five times their diameter, from posterior lateral eyes by the same distance. Laterals separated by 2.5 times the diameter of posterior laterals. Quadrangle wider behind than in front in ratio 17 : 13, as wide as long. Clypeus vertical, equal to the length of quadrangle. Chelicerae weak, cone-shaped. Labium oval, more long than wide, rounded anteriorly, reaching beyond middle of maxillae. Maxillae with convex outer edges, inclined over labium and almost meeting in front, with rounded ends. Sternum convex, shield-shaped, as wide as long, truncated between fourth coxae which almost touch each other. Second coxae wide apart.

Colour in life: Carapace yellow with a median pale black band and a narrow submarginal and a marginal dark stripe. Chelicerae, labium, maxillae and palpi yellow. Legs yellow with black spots. Abdomen yellow with a median pale black band, two pairs of black longitudinal lines and black fleck. Belly and spinnerets darker than the back.

Distribution: France, Hungary, Germany, England, U.S.S.R., U.S.A., Japan (Southern Kurile Islands).

Family III. *CLUBIONIDAE*

Two of five Subfamilies are represented in the fauna of Hokkaido. The Subfamily Clubioninae can be distinguished by the constriction of the maxillary lobes from the another Subfamily Micarinae in which the maxillary lobes are truncated.

I Subfamily *CLUBIONINAE*

Our four species represent two distinct genera which can be separated as follows:

a. Posterior legs longer than the anterior legs; tibiae and metatarsi of the first two pairs of legs armed beneath with paired spines. .... 1. Gen. *Clubiona* LATREILLA

b. Anterior legs longer than the posterior legs; anterior legs armed with but few spines, and these not paired. .... 2. Gen. *Chiracanthium* C. L. KOCH

1. Genus **Clubiona** LATREILLA, 1804

16. *Clabiona mantis* BÖS. et STRAND

Pl. XIV, Fig. 45, a. Carapace of male. b, c. Palpus of male.

Clubiona mantis, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 286, Taf. 16, Fig. 492.

Locality: Sapporo (1 male, S. SAITO, June 22, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	0.60	0.40	0.90	0.90	0.70	1.00

Male: Carapace 0.30 cm. long, 0.28 cm. wide between second and third coxae, without radial and cervical furrows, with an indefinite median groove. Eight eyes in two rows, equal in size. Four anterior and two posterior

lateral eyes arranged on a recurved row, and these six eyes equidistant, separated by their radius. Interval between two posterior median eyes equal to twice their diameter, somewhat longer than the interval between the posterior median and posterior lateral eyes. Quadrangle wider behind than in front in ratio 7 : 4, as long as wide. Clypeus equal to the radius of anterior median eyes. Chelicerae relatively weak, with divergent margins. Labium rectangular, articulated to maxillae at 1/2 distance from base. Maxillae much wider in front than at base in ratio 3 : 2, with divergent outer margins. Sternum concave, lengthened oval, truncated anteriorly, pointed behind.

Colour in life: Carapace brownish yellow, brown toward caput. Chelicerae black. Maxillae and labium deep brown. Sternum darker than carapace. Legs and abdomen dark brown.

Distribution: Japan (Kyushu).

17. ***Clubiona lutescens*** WESTRING

Pl. XIV, Fig. 46, a, b. Palpus of male.

Clubiona lutescens, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 225.; ——— :—Südrussischer Spinnen, St. Petersburg, 1875, p. 40.; E. SIMON:—Arachn. de France, Paris, Tom. 4, 1878, p. 219.; O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 149.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 2. 1897, p. 227.; W. BÖSENBERG:—Zoologica, Stuttgart, Bd. 14, 1903, p. 276, Taf. 26, Fig. 405.:—W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 283, Taf. 16, Fig. 485.; S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 328, Fig. 3.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 32, 33, Taf. 5, Fig. 352, Taf. 6, Fig. 365.

Locality: Sapporo (2 males, 7 immature females, S. SAITO, Oct. 27, 1929, June 23, 30, Aug. 11, 1930.; H. ITOH, July 5, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Sapporo)	0.80	0.50	0.90	0.90	1.10	1.10
male (Sapporo)	0.85	0.60	0.90	0.90	0.95	1.20

Male: Carapace with chelicerae 0.32 cm. long, 0.23 cm. wide between second and third coxae. Anterior row of eyes recurved, posterior row procurved and much longer than the anterior. Median eyes of both rows larger than the lateral eyes in ratio 3 : 2. Anterior median eyes separated from each other by their radius, from anterior lateral eyes by their diameter. Posterior median eyes separated from each other by twice their diameter, from posterior lateral eyes by their diameter. Lateral eyes of both rows

separated by their diameter. Quadrangle much wider behind than in front in ratio 9 : 5, wider than long in ratio 10 : 7. Clypeus narrow, practically wanting. Chelicerae long with divergent outer edges. Labium more long than wide, a little shorter than maxillae. Maxillae slightly wider in front than at base. Sternum flat, lengthened oval, narrowed anteriorly to the width of labium, bluntly ending posteriorly. Second coxae most widely apart, fourth coxae contiguous.

Colour in life: Light yellow, chelicerae deeper than the other parts.

Distribution: Germany, France, Hungary, U.S.S.R., Japan (Southern Saghalien).

18. ***Clubiona glatiosa*** n. sp. Jap. name, *Fusa fukurogumo.*

Pl. XII, Fig. 10. Dorsal view of male.

Pl. XIV, Fig. 47. Eyegroup.

Locality: Sapporo (1 male, S. SAITO, Oct. 12, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	0.30	0.20	0.40	0.40	0.30	0.40

Male: Carapace 0.11 cm. long, with definite cervical and median furrows. Eight eyes in two rows, equal in size. Anterior row recurved, *posterior row straight and much longer than anterior row.* Anterior eyes equidistant, separated by 7/5 of their diameter. Posterior median eyes separated from each other by three times their diameter, from posterior lateral eyes by their diameter. Quadrangle wider behind than in front in ratio 5 : 3, as long as wide. Lateral eyes of both rows separated by three times their radius. Clypeus equal to the diameter of eyes. Chelicerae weak, cone-shaped and diverging. Labium triangular, as long as wide. Maxillae slightly wider at end than long, much wider in front than at base in ratio 3 : 2. Sternum shield-shaped, convex, with concave anterior margin and posterior blunt end. First coxae most widely apart, fourth coxae separated by twice their width.

Colour in life: Carapace white with bright brown band at the thoracic margin and the same colour along cervical and median furrows. Chelicerae, maxillae and labium white. Sternum pale brown. Palpi and legs white with bright brown at the base of all joints. Abdomen bright brown with a leaf-marking of white spots. Belly pale brown.

Remarks: This species differs from the other species of *Clubiona* in the bright colour and especially in the eye intervals.

2. Genus *Chiracanthium* C. L. Koch, 1839

19. *Chiracanthium lascivum* Karsch

Pl. XIV, Fig. 48, a. Carapace of female. b. Palpus of male.

Chiracanthium lascivum, F. Karsch:—Verhandl. d. N. V., Jahrg. 36, 1879, p. 91.; W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1905, p. 287, Taf. 16, Fig. 502.; S. Saito:—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 329, Fig. 4.

Locality: Vicinity of Sapporo (1 male, 2 females, S. Saito, Aug. 10, 1930). Ikusagawa (3 females, H. Itoh, August 10, 1930). Mt. Daisetsu (1 male, S. Nishio, August 1-5, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Sapporo)	1.70	1.10	2.80	1.80	1.20	1.90
female (Sapporo)	1.30	1.00	2.70	1.30	1.20	1.90
male (Sapporo)	1.45	0.60	3.50	2.80	1.90	2.60
female (Ikusagawa)	1.30	0.80	2.60	1.70	1.30	1.80
female (Ikusagawa)	1.00	0.70	2.20	1.40	1.10	1.80
female (Ikusagawa)	1.10	0.80	2.40	1.70	1.10	2.00
male (Mt. Daisetsu)	1.20	0.70	3.50	2.40	1.60	2.40

Male: Carapace with chelicerae 0.70 cm. long, 0.40 cm. wide, truncated in front. Eyes occupy almost full width of carapace which measures in the eye region 0.30 cm. Eyes in two rows. Anterior row slightly recurved, posterior row nearly straight and longer than the anterior. Posterior median eyes alone nocturnal, separated from each other by three times their radius, and from posterior lateral eyes by the same interval. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by a slightly longer distance. Quadrangle wider behind than in front in ratio 4 : 3 and slightly wider than long. Clypeus equal to the diameter of anterior median eyes. Chelicerae with very weak condyles. Basal joint 0.30 cm. long. Labium more long than wide in ratio 4 : 3, reaching slightly beyond middle of maxillae. Sides almost parallel and anterior margin straight. Maxillae long, with both sides concave. Outer angle rounded. Oblique depression wanting. Sternum heart-shaped, as long as wide, narrowed in front, with convex anterior margin, pointed posteriorly. Fourth coxae almost contiguous.

Colour in life: Carapace uniformly brownish yellow, abdomen slightly

paler. Belly darker than carapace, palpi and legs paler than abdomen but the fourth legs alone blue. Sternum deep brown. Chelicerae, labium and maxillae black.

Distribution: Japan (Southern Saghalien, Honshu ?, Kyushu ?).

II Subfamily *MICARINAE*

The members of this Subfamily resemble the jumping spiders (Attidae) in body form, but they can be easily recognized by the arrangement of the eyes in two rows. Only one new species is identified in this study.

1. Genus ***Castianeira*** KEYSERLING, 1879

20. ***Castianeira albimaculata*** n. sp.

Jap. name, *Shirobuchi-jigabachigumo.*

Pl. XII, Fig. 11. Dorsal view of female.

Pl. XIV, Fig. 49, a. Epigynum. b. Eyegroup.

Locality: Vicinity of Sapporo (1 female, S. SAITO, August 10, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.90	0.60	0.90	0.80	0.90	1.00

Female: Carapace 0.40 cm. long, 0.26 cm. wide between second and third coxae. Eyes in two rows. Both rows nearly straight. Posterior *row much longer than anterior row, and its eyes nocturnal. Anterior median* eyes separated from each other by their diameter, from anterior lateral eyes by 4/9 of their diameter. Posterior eyes equidistant, separated from each other by their diameter. Quadrangle rectangular, more long than wide in ratio 15 : 12. Clypeus equal to two diameters of anterior median eyes. Chelicerae vertical, short, weak. Labium oval, more long than wide in ratio 5 : 4, with almost parallel sides, reaching slightly beyond middle of maxillae. Maxillae parallel, with concave inner edges. Sternum convex, shield-shaped, much more long than wide in ratio 3 : 2, pointed between fourth coxae which are subcontiguous. The part between the second coxae is broadest.

Colour in life: Carapace deep black. Chelicerae black with brown fang. Labium and maxillae black with white ends. Sternum deep black. Coxae, trochanters, femora, basal parts of tibiae, terminal parts of metatarsi and tarsi of first legs, coxae, trochanters, femora of second legs, the terminal

parts of femora of third and fourth legs black and the other part yellow. Abdomen black with a pair of white patches at the median part and a white patch at anterior part. Belly black with a median yellow band.

Remarks: This is much the same in general appearance as *Castiancira descripta* (HENTZ) (*Geotrecha crocata* EMERTON). But it differs from the latter in the presence of white patches on the abdomen, in the absence of a bright red spot at the hinder end of the abdomen and in the form of the epigynum.

Family IV. *ATTIDAE*

The Attidae is one of the largest and most widely distributed of the families of spiders; they especially are abundant in the tropics. The present specimens include five genera; the following table will aid in the separation of them.

1. a. The lower margin of the furrow of the chelicerae armed with several small teeth. .... 2.
   b. The lower margin of the furrow of the chelicerae armed with a great tooth. .... 3.
2. a. The sides of the ocular quadrangle almost parallel. .... 3. Gen. *AElurillus* SIMOM
   b. Ocular quadrangle much wider behind than before. .... 2. Gen. *Fellenes* SIMON
3. a. Patella and tibia of the third legs longer than those of the fourth legs. .... 4. Gen. *Evarcha* SIMON
   b. Patella and tibia of the third legs shorter than those of the fourth legs. .... 4.
4. a. Small eyes much more remote from the posterior eyes than from the anterior eyes. .... 5. Gen. *Icius* SIMON
   b. Small eyes situated midway between the anterior lateral and the posterior lateral eyes. .... 5.
5. a. First pair of legs stouter than the second pair. .... 6. Gen. *Marpissa* C. KOCH
   b. First two pairs of legs similar. .... 1. Gen. *Plexippus* C. KOCH

1. *Genus* ***Plexippus*** C. KOCH, 1846

21. ***Plexippus paykullii*** (AUDOUIN)

Plexippus paykullii, T. THORELL:—Desciiptive Catalogue of the Spiders of Burma, British Mus., London, 1895, p. 360.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 362, Taf. 9, Fig. 142, Taf. 13, Fig. 347, 354.; A. PETRUNKEVITCH:—

Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 695.; S. SAITO:—Trans. Sapporo Nat. Hist., Vol. 13, 1933, p. 38.

Hasarius paykulli, E. SIMON:—Arachn. de France, Paris, 1876, Tom. 3, p. 81.

Thotmus paykulli, O. P. CAMBRIDGE:—Biol. Centr. Amer., 1897–1905, Vol. 1, p. 240, Taf. 20, Fig. 21.; A. PETRUNKEVITCH:—Trans. Connecticut Academy Arts and Science. Vol. 31, 1930, p. 156.

Locality: Sapporo (1 female, S. SAITO, June 23, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.63	0.36	0.42	0.34	0.39	0.44

Female: Carapace 0.23 cm. long, 0.20 cm. wide between second and third coxae. Lateral eyes form a rectangle which is wider than long in ratio 25 : 17. Posterior median eyes situated midway between anterior lateral eyes and posterior lateral eyes. Width of eye region considerably smaller than width of carapace. Upper margin of chelicerae with two teeth, lower margin with a single pointed tooth. Maxillae much longer than wide and slightly wider in front than at base. Sternum somewhat convex, oval, shiny, transversely truncated in front to width of labium, more long than wide in ratio 3 : 2. First coxae wide apart, fourth coxae subcontiguous.

Colour in alcohol: Carapace black with a yellow median patch and yellow marginal lines. Abdomen yellow with a pair of black longitudinal bands. Legs and palpi yellow. Chelicerae, maxillae, labium and sternum dark yellow.

Distribution: A common cosmotropical species of the Old and New Worlds. Guiana, Paraguay, Costa Rica, Colombia, West Indies, U.S.A., Mexico, Burma, Japan (Honshu, Kyushu, Formosa).

2. Genus ***Pellenes*** SIMON, 1876

22. ***Pellenes nigrocilliatus*** L. KOCH

Pellenes nigrociliatus, W. BÖSENBERG:—Zoologica, Stuttgart, Bd. 14, 1903, p. 423, Taf. 65, Fig. 622.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 42, Taf. 8, Fig. 478.

Pellenes Bedeli, E. SIMON:—Arachn. de France, Paris, Tom. 3, 1876, p. 98.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 36.

Attus Brassayi, O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 316.

Locality: Soranuma (1 male, 1 female, S. MAKINO, Sept. 8, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.54	0.35	0.37	0.33	0.43	0.42
male	0.45	0.28	0.37	0.30	0.40	0.47

Female: Carapace 0.24 cm. long, 0.18 cm. wide between second and third coxae, furnished with long black hairs at anterior margin. Viewed from in front, first row of eyes is straight by upper edges, Clypeus practically wanting. Small eyes slightly nearer to posterior lateral than to anterior lateral eyes. Chelicerae vertical, short and stout. Labium almost a triangle in shape, more wide than long. Labium barely reaches middle of maxillae. Maxillae with parallel truncatures and parallel outer edges. Sternum oval, more long than wide in ratio 3 : 2, truncated in front to width of labium. First coxae a little wider apart than width of labium, fourth coxae subcontiguous.

Colour in alcohol: Carapace brownish yellow with a pair of black longitudinal bands. Palpi, legs and sternum pale brown. Chelicerae, maxillae and labium brown. Abdomen brownish yellow with black markings. Belly pale brown with black spots.

Male: Carapace 0.23 cm. long, 0.17 cm. wide between second and third coxae. Colour of abdomen greenish yellow and its black markings clearer than those of female.

Distribution: Germany, Hungary, France.

3. Genus *AElurillus* Simon, 1884

23. ***AElurillus subfestivus*** n. sp. Jap. name, *Kita-haetorigumo.*

Pl. XII, Fig. 12. Dorsal view of female.

Pl. XIV, Fig. 50, a. Epigynum. b. Carapace from above.

Locality: Chitose (1 female, Y. Ohta, Oct. 17, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.79	0.54	0.60	0.54	0.72	0.64

Female: Carapace 0.35 cm. long, 0.24 cm. wide between second and third coxae. Quadrangle of lateral eyes rectangular, with almost parallel sides but slightly wider in front than behind, as wide as long. Second row of eyes nearer to posterior row than to anterior row in ratio 3 : 1. Anterior median eyes separated from each other by 3/18 of their diameter.

A straight line tangent to inner edges of anterior lateral eyes and posterior lateral eyes of the outer side, is tangent to inner edge of eyes of median row. Clypeus equal to the diameter of anterior lateral eyes. Chelicerae vertical, inner edge contiguous, outer edges converging. Labium triangular, as long as wide, reaching considerably beyond middle of maxillae. Maxillae much wider in front than at base. Sternum oval, flat, much more long than wide, narrowed in front to width of labium. First coxae separated by the width of the labium, fourth coxae nearly contiguous.

Colour in alcohol: Carapace and chelicerae black. Maxillae and labium black with white ends. Legs above black with dull yellow tarsi and under side blackish brown. Abdomen above black, sides and belly blackish brown.

Remarks: In size and general appearance the species is closely allied to *AElurillus festivus* (L. KOCH), but it differs from the latter in the form of epigynum.

4. Genus ***Evarcha*** SIMON, 1902

24. *Evarcha albaria* (L. KOCH) Jap. name, *Mamijiro-haetorigumo.*

Evarcha albaria, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 361, Taf. 9, Fig. 140, Taf. 13, Fig. 350.; S. YUHARA:—Study of Spiders (in Japanese), Tokyo, 1930, p. 266, Fig. 151.

Hasarius albarius, L. KOCH:—Verhandl. d. k. k. zool. bot. Ges., Bd. 27, 1877, p. 750, Taf. 16, Fig. 39.

Locality: Mt. Yubari (1 male, S. MOTODA, July 9, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	0.70	0.40	0.60	0.55	0.60	0.65

Male: Carapace 0.40 cm. long, 0.28 cm. wide, 0.20 cm. high, sloping gently forward, posteriorly declivity steep. Viewed from front, first row of eyes straight by upper edge and eyes equally separated by 1/5 of the diameter of anterior median eyes. A straight line drawn through the upper edges of anterior lateral eyes and posterior median eyes cuts the posterior lateral eye of the same side through the centre. The small eyes or posterior median eyes are slightly nearer to the posterior lateral eyes than to the anterior lateral ones. Clypeus equal to radius of anterior lateral eyes. There are characteristic long white hairs on the anterior declivity. Chelicerae short and stout, vertical, somewhat gibbous in front. Inner edges in contact with each other, outer edges nearly parallel. Maxillae wider

in front than at base, with more or less rounded upper outer angle. Labium more long than wide at base but a little in front of base almost as wide as long, reaches beyond middle of maxillae and is rounded anterioly. Sternum flat, more long than wide in ratio 3 : 2, truncate in front to twice width of labium. Fourth coxae almost contiguous and the part between the second coxae most widely separated.

Colour in alcohol: Carapace deep brown furnished with black hairs. Eye region and chelicerae black. Labium, maxillae and sternum blackish yellow. Legs black with dull yellow coxae. Palpi black, but the terminal joint furnished with white hairs. Abdomen dull yellow with dense black hairs. Belly uniformly black.

Distribution: Japan (Kyushu, Honshu).

5. Genus ***Icius*** SIMON, 1874

25. ***Icius daisetsuzanus*** n. sp. Jap. name, *Ezo-tobigumo.*

Pl. XII, Fig. 13. Dorsal view of female.

Pl. XIV, Fig. 51, a. Eyegroup. b. Epigynum.

Locality: Mt. Daisetsu (3 females, Dr. T. INUKAI, July 16–20, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.68	0.40	0.54	0.48	0.50	0.82
female	0.59	0.36	0.45	0.42	0.43	0.74
female	0.42	0.30	0.35	0.30	0.24	0.50

Female: Carapace 0.30 cm. long, 0.20 cm. wide between second and third coxae. Cervical, radial and median furrows wanting, furnished with long, black hairs. Eight eyes in three rows, anterior four eyes nocturnal. Anterior median eyes largest, eyes of second row smallest. Anterior median eyes subcontiguous with each other, separated from the laterals by 1/3 of their diameter. Eye region rectangular, more wide than long in ratio 2 : 1. Small eyes or posterior median eyes somewhat more remote from the posterior lateral eyes than from anterior lateral eyes. Clypeus equal to the diameter of anterior lateral eyes. Chelicerae small, stout, cone-shaped. Labium heart-shaped and rounded in front. Sternum oval, more long than wide in ratio 2 : 1. Fourth coxae subcontiguous.

Colour in alcohol: Carapace black with brown caput. Chelicerae, sternum, maxillae, labium, palpi and legs dull brown. Belly blackish brown.

Remarks: The species much resembles the American *Icius elegans* KEYSERLING (*Tutelina elegans* HENTZ) in general appearance, but it is easily distinguishable by the colour of abdomen and the form of epigynum.

6. Genus *Marpissa* L. KOCH, 1846

26. *Marpissa muscosa* CLERCK

Marpissa muscosa, E. SIMON:—Arachn. de France, Paris, Tom. 3, 1876, p. 25.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 15, Tab. 1, Fig. 15.; W. BÖSENBERG:—Zoologica, Stuttgart, Bd. 14, 1903, p. 444, Taf. 63, Fig. 650.; H. ZIMMERMANN:—Spin. Umgegend von Niesky, p. 128.

Marpessa muscosa, T. THORELL:—Südrussischer Spinnen, St. Petersburg, 1875, p. 76.; O. HERMAN:—Ungarns Spinnen Fauna, Budapest, Bd. 3, 1879, p. 304.

Araneus muscosus, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 367.

Salticus tardigradus, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 63, pl. 3, Fig. 35.

Locality: Vicinity of Sapporo (1 female, S. SAITO, June 23, 1931). Sapporo (1 male, 2 females, S. SAITO, July 15, 1931, May, July 23, 1933). Yakumo (1 female, S. SAITO, July 25, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Sapporo)	0.70	0.40	0.70	0.50	0.50	0.70
female (Sapporo)	1.00	0.70	0.70	0.70	0.60	0.80
female (Sapporo)	1.10	0.70	0.70	0.70	0.60	0.70
female (Sapporo)	1.10	0.70	0.70	0.60	0.80	0.90
female (Yakumo)	1.10	0.80	0.70	0.60	0.70	0.80

Female: Carapace flat, 0.40 cm. long, 0.23 cm. wide between second and third coxae. Cervical, radial and median furrows wanting. Anterior eyes subcontiguous and upper edges arranged in a straight line. Quadrangle of lateral eyes more wide than long in ratio 6 : 5. Eyes of second row situated midway between the first and the third row. Clypeus equal to 1/2 of the diameter of anterior lateral eyes and furnished with long white hairs. Chelicerae short, stout, vertical and parallel. Labium more wide than long, reaching far beyond middle of maxillae, rounded in front. Sternum oval, flat, narrowed anteriorly to width of labium and more long than wide in ratio 3 : 2. First coxae separated by their width, fourth coxae subcontiguous. The space between second coxae broadest.

Colour in life: Carapace black with white hairs. Chelicerae brown. Maxillae and labium black with yellowish brown ends. Sternum black. Legs above black, below dull yellow. Abdomen black with white hairs. Belly dull yellow.

Distribution: *France, Germany, Hungary, U. S. S. R.*

Family V. *PHOLCIDAE*

Only a single species of *Pholcus* common found in Honshu represents this family in Hokkaido.

1. Genus *Pholcus* WALCKENAER, 1805

27. *Pholcus crypticolens* Bös. et STRAND Jap. name, *Yureigumo.*

Pholcus crypticolens, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 127, Taf. 6, Fig. 72, Taf. 15, Fig. 440.; S. YUHARA:—Study of Spiders (in Japanese), Tokyo, 1930, p. 87, 88, Fig. 20, 21.

Locality: Sapporo (2 males, 2 females, S. SAITO, Sept. 20, 1929, June 22, 1930, May, July 15, 1933). Akkeshi (1 male, 1 female, S. MOTODA, July 29, 1931). Kushiro (2 males, 1 female, S. MOTODA, July 29, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Sapporo)	0.50	0.30	2.80	2.10	1.60	2.10
male (Sapporo)	0.45	0.30	2.62	1.37	1.20	1.95
female (Sapporo)	0.40	0.25	2.05	1.65	1.55	1.85
female (Sapporo)	0.30	0.20	1.70	1.45	1.05	1.60
male (Akkeshi)	0.50	0.35	2.90	1.50	1.60	2.10
female (Akkeshi)	0.36	0.23	1.50	1.10	0.90	1.20
male (Kushiro)	0.45	0.32	2.50	2.04	1.65	1.96
male (Kushiro)	0.50	0.35	2.73	2.10	1.65	1.97
female (Kushiro)	0.48	0.35	2.14	1.76	1.21	1.77

Female: Carapace 0.17 cm. long, 0.11 cm. wide between second and third coxae, flat, oval, with a definite median furrow, but cervical groove wanting. Eyes eight in three groups arranged transversely. Two eyes of median group small, almost contiguous. Three eyes of each side equal in size, situated on an ocular tubercle. Viewed from in front, three groups of eyes straight along anterior margins. Clypeus equal to the diameter of small eyes. Chelicerae weak. Labium triangular, rounded in front, reaching middle of maxillae. Sternum trapezoid in shape, with a concave anterior margin, truncated posteriorly so that fourth coxae are separated widely.

Colour in life: Carapace dull white. Eye tubercles black. Sternum light yellowish black. Chelicerae, maxillae and labium light brown. Abdomen yellowish white.

Distribution: Japan (Honshu, Kyushu).

Family VI. *THERIDIIDAE*

The species of this family found in Hokkaido are referable to the following genera.

1. a. Cephalothorax with a transverse furrow in the middle. Abdomen prolonged. .... 3. Gen. *Argyrodes* SIMON
   b. Cephalothorax without transverse furrow. Abdomen not greatly prolonged. .... 2.
2. a. Labium long and pointed, more than half as long as the maxillae. .... 2. Gen. *Teutana* SIMON
   b. Labium transverse, not more than half as long as the maxillae. .... 1. Gen. *Theridion* WALCKENAER

1. Genus *Theridion* WALCKENAER, 1805

28. *Theridion subpallens* Bös. et STRAND

Pl. XIV, Fig. 52, a. Epigynum from above. b. Sideview of epigynum. c. Eyegroup.

Theridium subpallens. W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 139, Taf. 12, Fig. 293.

Locality: Kushiro (1 female, S. MOTODA, July 29, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.20	0.15	0.35	0.32	0.18	0.21

Female: Carapace 0.11 cm. long, with a definite cervical and a median longitudinal furrow. Eight eyes in two rows, anterior row recurved, posterior row slightly procurved. Anterior median and posterior lateral eyes somewhat smaller than the others. Anterior eyes equidistant and separated by the diameter of anterior median eyes. Lateral eyes of both rows contiguous. Quadrangle rectangular, more long than wide in ratio 11 : 8. Clypeus equal to the diameter of posterior median eyes. Chelicerae parallel, weak. Labium triangular, rounded in front, straight behind. Maxillae inclined over the labium, with parallel outer margins, wider in front than at base in ratio 3 : 2, more long than wide in front in ratio 4 : 3. Sternum oval, convex, narrowed to the width of labium, pointed behind between fourth coxae which are separated by their width.

Colour in alcohol: Dull brown. Abdomen, sternum and chelicerae deeper than carapace, and palpi, legs, maxillae and labium paler than carapace.

Distribution: Japan (Kyushu ?).[1]

29. ***Theridion tepidariorum*** C. L. Koch Jap. name, *Ôhimegumo.*

Theridion tepidariorum, J. Blackwall:—Spid. Gr. Brit. & Ir., London, 1864, p. 180, pl. 13, Fig. 114.; ————:—Ann. Mag. Nat. Hist., 4 ser., Vol. 8, 1871, p. 435.; O. P. Cambridge:—Ibid., 5 ser., Vol. 1, 1878, p. 155.; E. Simon:—Arachn. de France, Paris, Tom. 5, 1881, p. 93.; T. Thorell:—Descriptive Catalogue of Spiders of Burma, British Mus., London, 1895, p. 95.; E. Simon:—Fauna Hawaiiensis, Cambridge, Vol. 2, Part. 5, 1900, p. 449.; J. A. Allen:—Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 207.; *J. H. Comstock:—Spider Book. New York, 1913*, p. 210, 299, 330, 345, 421, Fig. 321, 323, 340–343.; R. Chamberlin:—Proc. U. S. Nat. Mus., Washington, Vol. 63, 1924, p. 5.; ————:—Proc. California Academy Scie., 4 ser., Vol. 12, 1924, p. 638.; C. R. Crosby and S. C. Bishop:—Memoir Cornell Univ. Exper. Station, Vol. 101, 1926, p. 1042.; R. Bremen:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 57, 59, Tab. 9, Fig. 647, Tab. 10, Fig. 662.; S. Yuhara:—Study of Spiders (in Japanese), Tokyo, 1930, p. 96, 97, Fig. 25, 26.; S. Saito:—Proc. Imper. Academy, Vol. 9, 1933, p. 273.; ————: Transact. Sapporo Nat. Hist., Vol. 13, 1933, p. 42.; ————:—Ibid., Vol. 13, 1934, p. 329.

Theridium tepidariorum, T. Thorell:—Rem. on Syn., Upsala, 1870–1873, p. 80.; ————:—Horae Societatis Entomologicae Rossicae, Vol. 11, 1875, p. 29; O. Herman:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 83.; G. Marx:—Proc. U.S. Nat. Mus., Vol. 10, 1890, p. 520.; C. Chyzer et L. Kulczynski:—Araneae Hangariae, Budapest, Tom. 2, 1894, p. 35.; T. Thorell:—*Estratto dagli Annali del Museo Civico di Storia* Naturale di Genova, 2 ser., Vol. 19, 1898, p. 45.; ————:—Bihang Till K. Svenska Vet.-Akad. Handlingar, Bd. 25, 1899, p. 25.; T. P. von Bayern:—Zool. Anz., Bd. 23, 1900, p. 283, W. Bösenberg:—Zoologica, Stuttgart, Bd. 14, 1903, p. 96, Tab. 8, Fig. 115.; J. H. Emerton:—Common Spiders, London, 1902, p. 111, Fig. 255–260.; W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1906, p. 148.; E. Strand:—Zool. Anz., Bd. 32, 1908, p. 219.; N. Banks:—Bull. Smithsonian Inst. U.S. Nat. Mus., Vol. 72, 1910, p. 20.

Theridion tepidatorium, E. Keyserling:—Spinnen Amerikas, Therididae, Nürnberg, 1884, Bd. 1, p. 9, Tab. 1, Fig. 1.

Theridion vulgare, N. M. Hentz:—Spiders U. S., Boston, 1875, p. 142, pl. 16, Fig. 1.

Locality: Makomanai (8 immature females, S. Saito, Sept. 23, 1929). Sapporo (1 male, 3 females, S. Saito, July 3, 1930, July 3, 1933). Oshoro (1 female, S. Saito, Sept, 19, 1930). Nemuro (2 females, S. Motoda, July 15, 1931). Yakumo (1 female, S. Saito, July 25, 1931). Kushiro (1 male, 2 females, S. Motoda, July 31, 1931. Dr. T. Inukai, July, August, 1933). Mt. Daisetsu (1 male, S. Nishio, August 1–5, 1932).

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1) The locality is uncertain. That in the original paper by E. Strand is stated as Saga (Kyushu) but it is no more than a surmise.

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Sapporo)	0.40	0.30	1.40	0.90	0.50	0.90
male (Kushiro)	0.37	0.27	0.99	0.61	0.45	0.57
female (Kushiro)	0.48	0.36	0.87	0.67	0.43	0.78
female (Kushiro)	0.54	0.43	1.10	0.82	0.61	0.70
female (Sapporo)	0.85	0.65	1.80	1.20	0.85	1.45
female (Sapporo)	0.85	0.70	1.80	1.10	0.70	1.30
female (Sapporo)	0.80	0.60	1.60	1.10	0.80	1.20
female (Oshoro)	0.60	0.40	1.60	0.90	0.70	0.80
female (Nemuro)	0.60	0.48	1.37	0.98	0.67	0.88
female (Nemuro)	0.60	0.47	1.83	1.30	0.80	1.27
female (Yakumo)	0.70	0.60	1.90	1.20	1.00	1.50

Female: Carapace 0.33 cm. long, 0.21 cm. wide between second and third coxae, with a median longitudinal furrow, small in proportion to the abdomen. Eight eyes in two rows, anterior row recurved and posterior row procurved so that the eyes are arranged on a circle. Posterior median eyes larger than the others, separated from posterior lateral eyes by their radius. Anterior eyes equidistant, separated by their diameter. Lateral eyes of both rows contiguous. Quadrangle wider behind than in front in ratio 13 : 10, somewhat longer than wide. Clypeus equal to the length of quadrangle of median eyes. Chelicerae weak, parallel, with short fangs. Labium more wide than long, rounded anteriorly, articulated to maxillae 1/3 distance from base. Maxillae more long than wide, contiguous with each other at anterior ends. Sternum convex, Shield-shaped, with concave anterior edge, bluntly ending posteriorly between fourth coxae which are separated by their diameter.

Colour in life: Carapace deep sepia. Chelicerae, maxillae and labium dull yellow. Sternum dark yellow. Palpi and legs dull yellow, annulated indistinctly with brownish yellow. Abdomen deep sepia with white spots. Belly dull yellow with black spots.

Distribution: Cosmopolitan.

2. Genus *Teutana* SIMON, 1881

30. *Teutana albimaculosa* n. sp. Jap. name, *Buchi-tsuzuregumo.*

Pl. XII, Fig. 14. Dorsal view of male.

Pl. XIV, Fig. 53. Carapace.

Locality: Sapporo (1 male, S. SAITO, May 14, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	0.50	0.30	0.95	0.90	0.45	0.82

Male: Carapace 0.19 cm. long, 0.11 cm. wide between second and third coxae, gradually narrowed in front. A shallow depression of an indefinite shape in place of a median furrow. Anterior row of eyes recurved, posterior row slightly recurved calculated by the center of eyes but almost straight by posterior margin. Posterior median eyes larger than the others which equal in size in ratio 2 : 1. Anterior median eyes subcontiguous with each other, separated by twice their diameter from anterior lateral eyes. Eyes of posterior row equidistant, separated by the radius of posterior median eyes. Lateral eyes of both rows contiguous. Quadrangle wider behind than in front in ratio 13 : 7, as wide as long. Clypeus equal to the diameter of the anterior median eyes. Chelicerae slender, parallel, with short, transverse, smooth margin and very short, stout fangs. Maxillae more long than wide, converging. Sternum convex, shield-shaped, with straight anterior edge, as wide as long. First coxae wide apart, fourth coxae separated by their width.

Colour in life: Carapace dark yellow with deep caput and margins. Chelicerae brownish black. Maxillae, labium and sternum darker than caput. Palpi and legs are the same in colour as carapace. Abdomen black with a white marginal band and four converse V-shaped markings of white spots. Belly white with dispersive black spots.

Remarks: The species is allied to *Teutana grossa* (C. L. KOCH), but it is distinguished from the latter by the darkness of colouration and also by the marking of abdomen.

3. Genus ***Argyrodes*** SIMON, 1864

31. ***Argyrodes yesoensis*** n. sp. Jap. name, *Yeso-isorogumo.*

Pl. XII, Fig. 15, a. Black female. b. White female. c. Sideview of black specimen.

Pl. XIV. Fig. 54. Eyegroup.

Locality: Jozankei (3 females, M. SHIRAZO, July 19, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.60	0.40	0.80	0.40	0.30	0.60
female	0.50	0.45	0.80	0.45	0.35	0.60
female	0.55	0.45	0.85	0.40	0.35	0.65

Female: Carapace high, 0.20 cm. long, 0.15 cm. wide between second and third coxae. Eye region occuping entire width of carapace. Radial furrow wanting. Eyes eight, in two rows. Both rows straight. Anterior eyes and posterior lateral eyes equal in size and posterior median eyes largest being twice the diameter of the other eyes. Anterior median eyes separated from each other by the distance of their diameter, from anterior lateral eyes by three times the diameter. Posterior median eyes separated from each other by their diameter, from posterior lateral eyes by a radius of the posterior lateral eyes. Lateral eyes separated by the diameter of the posterior median eyes. Quadrangle wider behind than in front in ratio 3 : 2. Clypeus broader than the diameter of anterior eyes. Chelicerae in perfect contact with each other along median line in proximal half, then divergent and attennuated toward end. Basal segment 0.05 cm. long. There is no tooth on the furrow of chelicerae Labium triangular, slightly more long than wide. Maxillae about as wide at base as at end. Sternum convex, more long than wide in ratio 3 : 2, with straight anterior edge, pointed between hind coxae which are almost contiguous. In a side view abdomen triangular, higher than long in ratio 9 : 8. Spinnerets six.

Colour in alcohol: Colour varies with the specimens, from almost white to black. Carapace from dull brown to black. Sternum, chelicerae, maxillae and labium brown. Legs white with brown annulations, but the coxae and trochanters black in black specimens. Abdomen from white to black with a yellow patch. Belly and spinnerets from brown to black.

32. ***Argyrodes silvicolum*** n. sp. Jap. name, *Gin-isoragumo.*

Pl. XIII, Fig. 16. Dorsal view of female.

Pl. XIV, Fig. 55, a. Epigynum. b. Sideview of carapace.

Locality: Makomanai (1 female, S. SAITO, Sept. 18, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.35	0.20	0.70	0.48	0.30	0.50

Female: Carapace 0.20 cm. long, 0.13 cm. wide between second and third coxae, with a definite cervical and a median furrow. The eye region bordered from the clypeus by a deep transverse furrow. Eyes eight in two rows, equal in size. Viewed from above, anterior row of eyes strongly recurved, posterior row nearly straight, somewhat procurved. Anterior median eyes alone diurnal, separated from each other by 3/2 of their diameter, from anterior lateral eyes by their diameter. Posterior eyes equidistant, separated by their diameter. Quadrangle wider in front than behind in ratio 6 : 5 as long as wide in front. Lateral eyes of both rows subcontiguous. Clypeus equal to the width of quadrangle of median eyes. Chelicerae weak, vertical, with convergent outer margins. Labium triangular, as wide as long. Maxillae rectangular, but somewhat wider in front than at base, with parallel inner margins. Sternum triangular, with straight anterior margin and pointed behind between fourth coxae which are separated by their width.

Colour in life: Carapace sepia with black colour along cervical groove. Chelicerae light brown. Maxillae, labium and sternum dull yellow. Abdomen silver white, with three transverse black lines at posterior part, black spots at the median part and a dull brown median line giving off five pairs of branches at the sides. Belly dull yellow.

Remarks: In respect to the presence of a furrow at the border between the eye region and clypeus this spider is somewhat similar to *Argyrodes fissifrons* O. P. CAMBRIDGE, but the present specimen is distinct in the round termination of the abdomen which in the latter is pointed.

Family VII. *LINYPHIIDAE*

This family includes about one hundred and eighty genera in the world, but only two genera, *Linyphia* and *Oedothorax* were found in Hokkaido.

1. Genus ***Linyphia*** LATREILLE, 1804

33. ***Linyphia emphana*** WALCKENAER

Pl. XV, Fig. 56, a. Epigynum from a little beneath. b. Epigynum from above.

Linyphia emphana, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 47.; O. HERMAN:—Ungarns Spinnen-Fauna, Budapest Bd. 3, 1879, p. 59.; E. SIMON:—Arachn. de France, Paris, Tom. 5, 1884, p. 233.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 2, 1894, p. 57.; W. BÖSENBERG:—Zoologica, Stuttgart, Bd. 14, 1903, p. 68, Taf. 5, Fig. 69.; E. STRAND:—Zool. Anz., Bd. 32, 1908, p. 216.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 73, 74, Taf. 13, Fig. 822, Taf. 12, Fig. 833.; S. SAITO:—Proc. Imper. Acad., Vol. 9, 1933, p. 273.

Locality: *Vicinity of Sapporo* (3 females, S. SAITO, August, 10, 1930). *Shiranuka* (2 immature males, 2 immature females, M. L. PEELLE, July 31, 1931). Mt Tokachitake (1 male, 1 female, S. SAITO, August 29, 1931). Shikaribetsu (5 females, S. SAITO, August 31, 1931). Soranuma (3 females, S. MAKINO, Sept. 8, 1931). *Kussharo* (4 *males*, 3 *females*, S. NISHIO, July 15–18, 1932). Mt. Daisetsu (7 females, 2 immature males, S. NISHIO, Aug. 1–5, 1932). Mt. Kurotake (7 immature males, 22 immature females, Dr. T. UCHIDA, August, 1, 1932). Mt. Ishikari (2 females, Dr. T. INUKAI, August 3, 1932). Mt. Akan (4 females, Dr. T. INUKAI, August, 1933). *Nopporo* (2 females, S. SAITO, August 17, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Tokachitake)	0.40	0.20	1.00	0.80	0.60	0.80
male (Kussharo)	0.70	0.50	1.50	1.30	1.00	0.83
male (Kussharo)	0.70	0.40	1.50	1.20	0.90	1.00
male (Kussharo)	0.70	0.40	1.50	1.30	0.80	1.20
male (Kussharo)	0.65	0.40	1.40	1.20	0.70	1.20
female (Soranuma)	0.65	0.45	0.96	0.77	0.61	0.70
female (Soranuma)	0.46	0.33	0.92	0.79	0.65	0.73
female (Shikaribetsu)	0.60	0.45	1.00	1.20	0.80	0.83
female (Kussharo)	0.65	0.40	1.40	1.10	0.90	1.10
female (Kussharo)	0.70	0.40	1.50	0.90	1.00	1.20
female (Kussharo)	0.60	0.40	1.10	1.20	0.60	0.80
female (Daisetsu)	0.80	0.60	1.40	1.10	0.70	1.30
female (Daisetsu)	0.80	0.60	1.20	1.30	0.80	0.95
female (Daisetsu)	0.70	0.50	0.80	1.20	0.80	1.30
female (Daisetsu)	0.80	0.60	1.50	1.30	0.90	1.10
female (Ishikaridake)	0.40	0.30	1.30	1.50	0.35	0.50
female (Ishikaridake)	0.50	0.40	0.70	1.00	0.60	0.80
female (Akan)	0.70	0.50	1.20	1.20	0.60	0.85
female (Akan)	0.70	0.50	1.20	1.00	0.70	0.95
female (Nopporo)	0.60	0.30	1.30	1.00	0.70	1.00
female (Nopporo)	0.40	0.20	1.00	0.70	0.40	0.60

Female: Carapace 0.25 cm. long, 0.14 cm wide between second and third coxae. *First row of eyes strongly recurved, second row in almost* straight line, rather slightly procurved and almost as long as the first. All eyes equal in size. Eyes of posterior row equidistant, separated from each other by three times the diameter of eye. Anterior median eyes contiguous with each other and the laterals of both rows contiguous. Quadrangle

equilateral triangular in shape. Clypeus equal to the separation of the posterior eyes. Chelicerae powerful, not strongly diverging, almost 2/3 of carapace. Labium triangular, more wide than long in ratio 4 : 3. Sternum convex, shield-shaped, more or less triangular, with the three angles rounded, more long than wide in ratio 6 : 5. Maxillae wider in front than at base. Fourth coxae separated by their width.

Colour in life: Carapace yellow. Chelicerae yellowish brown, with sepia fangs. Labium, maxillae and sternum sepia, the latter darker than the others. Palpi and legs yellowish green. Abdomen white with sepia markings at anterior part and black markings at posterior part. Belly white with a dark broad median band. Spinnerets black.

Distribution: Germany, France, Hungary.

34. ***Linyphia pusilla*** SUNDEVALL

Pl. XV, Fig. 57, a. Epigynum from above. b. Sideview of epigynum.

Linyphia pusilla, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 50; ———:—Südrussischer Spinnen, St. Petersburg, 1875, p. 22.; L. KOCH:—Arachn. Sibirien Novaja Semlja, Stockholm, 1879, p. 9.; O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 65.; E. SIMON:—Arachn. de France, Paris, Tom. 5, 1884, p. 244.; E. KEYSERLING:—Spinnen Amerikas, Theridiidae, Vol. 2, 1886, p. 55, pl. 12, Fig. 163.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 2, 1894, p. 58, Tab. 2, Fig. 25.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, p. 70, Taf. 6, Fig. 72.; A. PETRUNKEVITCH:—Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 253.; J. H. COMSTOCK:—Spider Book, New York, 1913, p. 398, Fig. 410, 411, 412.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 73, 74, Taf. 13, Fig. 818, 835.

Linyphia fuliginea, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 216, pl. 15, Fig. 142.; ———:—Ann. Mag. Nat. Hist., 2 ser., Vol. 8, p. 450.

Linyphia mandibulata, J. H. EMERTON:—Common Spiders, Boston, 1902, p. 139, Fig. 325–329.

Locality: Mt. Daisetsu (1 female, Dr. T. INUKAI, August 14, 1930). Yakumo (1 male, 2 females, S. SAITO, July 24, 1931). Lake Akan (2 females, S. MOTODA, July 31, 1931). Shiranuka (3 females, L. M. PEELLE, July 31, 1931). Soranuma (1 male, 2 immature females, S. MAKINO, Sept. 8, 1931). Mt. Kurotake (1 male, Dr. T. UCHIDA, August 1, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Soranuma)	0.47	0.29	0.92	0.92	0.62	0.85
male (Mt. Kurotake)	0.50	0.35	0.80	0.70	0.60	0.65
male (Yakumo)	0.55	0.33	1.00	0.90	0.70	0.85
female (Yakumo)	0.53	0.36	0.75	0.70	0.65	0.80
female (Yakumo)	0.66	0.42	0.75	0.75	0.55	0.90

female (Mt. Daisetsu)	0.44	0.33	1.00	0.89	0.79	0.88
female (Lake Akan)	0.40	0.35	0.52	0.41	0.36	0.55
female (Lake Akan)	0.42	0.35	0.46	0.40	0.35	0.50
female (Shiranuka)	0.55	0.40	0.80	0.80	0.50	0.80
female (Shiranuka)	0.50	0.40	1.10	0.80	0.65	1.00
female (Shiranuka)	0.55	0.35	0.80	0.80	0.50	0.80

Female: Carapace 0.25 cm. long, 0.15 cm. wide between second and third coxae. First row of eyes recurved and second row procurved. Posterior median eyes largest and anterior lateral eyes smallest, the others equal in size. Anterior median eyes separated from each other by their radius, from anterior lateral eyes by three times their diameter. Posterior median eyes separated from each other by 1/4 of their diameter, from the posterior laterals by their diameter. Laterals of both rows contiguous with each other. Quadrangle more long than wide in ratio 3 : 2, wider behind than in front in ratio 11 : 6. Chelicerae moderately long and strong, convex in front. Clypeus equal to the length of quadrangle. Labium with circular base and gently converging sides, more wide than long in ratio 10 : 9. Maxillae with parallel sides, twice as long as wide. Inner upper angle considerably produced. Sternum shield-shaped, truncated in front, pointed behind.

Colour in life: Carapace blackish brown, with black cervical groove. Chelicerae and sternum darker than carapace. Labium and maxillae black. Legs and palpi dull yellow. Abdomen white with characteristic black markings. Belly and spinnerets uniformly black.

Distribution: *Alaska, U. S. A., Siberia, U. S. S. R., Hungary, Germany, France.*

35. ***Linyphia marginata*** C. L. Koch

Pl. XV, Fig. 58, a. Epigynum from above. b. Epigynum from a little beneath.

Linyphia marginata, T. Thorell:—Rem. on Syn., Upsala, 1870–1873, p. 51.; O. Herman:—Ungarns Spinnen Fauna, Budapest, 1879, p. 58.; J. Emerton:—Trans. Connecticut Acad. Sc., Vol. 6, 1882, p. 61, pl. 18, Fig. 1.; E. Simon:—Arachn. de France, Paris, Tom. 5, 1884, p. 231.; E. Keyserling:—Spinnen Amerikas, Theridiidae, Nürnberg, 1886, Vol. 2, p. 58, pl. 12, Fig. 164.; J. H. Comstock:—Spider Book, New York, 1913, p. 390, Fig. 404, 405.; W. Bösenberg:—Zoologica, Stuttgart, 1903, Bd. 14, p. 67, Taf. 5, Fig. 66.; A. Petrunkevitch:—Bull. Amer. Nat. Hist., Vol. 29, 1911, p. 252.; W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1905, p. 173, Taf. 10, Fig. 192.; R. Bremen:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 73, Taf. 12, Fig. 814, Taf. 13, Fig. 813.; M. L. Peelle and S. Saito:—Jour. Faculty Sc. Hokkaido Imp. Univ., 6 ser., Vol. 2, 1932, p. 90, Fig. 5.

Linyphia triangularis, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 212, pl. 15, Fig. 139.

Locality: Mt. Akan (5 females, Dr. T. INUKAI, July, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.55	0.40	0.65	0.70	0.40	0.55
female	0.50	0.40	0.65	0.65	0.35	0.50
female	0.50	0.35	0.60	0.65	0.35	0.55
female	0.50	0.35	0.65	0.65	0.30	0.55
female	0.40	0.30	0.60	0.60	0.30	0.50

Female: Carapace 0.22 cm. long, 0.07 cm. wide between second and third coxae. The anterior row of eyes, seen from above, is slightly recurved and the posterior row is nearly straight. Anterior median eyes slightly smaller than the others which are equal in size. Posterior median eyes separated from each other by their diameter. Lateral eyes of both rows almost in contact with each other. Quadrangle oblong, more long than wide. Chelicerae small, vertical and cone-shaped. Labium triangular, more wide than long in ratio 3 : 1. Maxillae triangular. Sternum pear-shaped, the place between the second coxae broadest.

Colour in alcohol: Carapace black with a marginal white band. Maxillae brown with light brown tips. Labium blackish brown. Chelicerae and sternum black. Palpi and legs bright yellow without marking. Abdomen light yellow with black marking at the middle part. Sides light black. Belly yellowish black with two yellow stripes from both sides of spinnerets to the spiracles.

Distribution: Europe, U. S. A., Japan (Kyushu, Iterup).

36. *Linyphia peltata* WIDER-REUSS.

Pl. XV, Fig. 59. a. Epigynum from above. b. Sideview of epigynum. c. Palpus of male.

Linyphia peltata, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 51.; E. SIMON:—Arachn. de France, Paris, Tom. 5, 1884, p. 236.; C. CHYZER et L. KULCZYNSKI;—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 57, Taf. 2, Fig. 15.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 68, Taf. 5, Fig. 68.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 73, Taf. 13, Fig. 824, Taf. 12, Fig. 832.

Linyphia rubea, J. BLACKWALL.—Ann. Mag. Nat. Hist., 2 ser; Vol. 8, p. 450.; ——— —:— Spid. Gr. Brit. & Ir., London, 1864, p. 217, pl. 15, Fig. 143.

Locality: Soranuma (2 females, S. MAKINO, Sept. 8, 1931). Lake Doya (1 immature male, Dr. T. INUKAI, May 27–29, 1932). Kussharo (3 females, S. NISHIO, July 15–18, 1932). Ishikiriyama (1 immature female,

M. TERUI, August, 1932). Mt. Ishikari (2 females, Dr. T. UCHIDA, August 3, 1932). Nopporo (2 females, 1 male, S. SAITO, August 17, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Nopporo)	0.50	0.30	1.70	1.50	1.00	1.30
female (Nopporo)	0.60	0.40	1.70	1.40	0.90	1.20
female (Nopporo)	0.45	0.30	1.40	1.20	0.70	1.10
female (Soranuma)	0.45	0.30	0.94	0.78	0.50	0.68
female (Soranuma)	0.42	0.27	1.30	1.10	0.90	1.00
female (Mt. Ishikari)	0.55	0.30	1.20	1.00	0.80	0.90
female (Mt. Ishikari)	0.45	0.30	1.40	1.20	1.00	1.10
female (Kussharo)	0.50	0.30	1.60	1.30	0.90	1.00
female (Kussharo)	0.50	0.30	1.70	1.40	1.00	0.80
female (Kussharo)	0.50	0.30	1.60	1.50	1.00	0.75

Female: Carapace 0.25 cm. long, 0.15 cm. wide between second and third coxae. Cervical groove in the shape of a peculiar, pigmented depression. Eyes equal. Anterior row recurved, posterior row straight. Laterals of each side contiguous. Both rows of eyes equal in length. Anterior median eyes almost contiguous with each other, separated from anterior lateral eyes by twice their diameter. Eyes of posterior row equidistant, separated by their diameter from each other. Quadrangle wider behind than in front in ratio 11 : 8. Clypeus equal to two diameters of eyes. Chelicerae stout and short, convex in front. Labium strongly rebordered, more wide than long in ratio 3 : 2, not quite reaching middle of maxillae. Sternum triangular, produced between hind coxae which are separated by a distance equal to their width.

Colour in life: Carapace, legs and palpi pale yellow. Chelicerae brownish yellow. Labium, maxillae and sternum black. Abdomen white with median black markings. Belly black with a pair of white dots at both sides of spinnerets and at the anterior part.

Distribution: Germany, France, Hungary, England.

37. ***Linyphia exornata*** L. KOCH

Pl. XIII, Fig. 17. Dorsal view of female.

Pl. XV, Fig. 60, a. Epigynum from above. b. Epigynum from a little beneath.

Linyphia exornata, L. KOCH:—Verhandl. d. k. k. zool. bot. Ges., Bd. 27, 1877, p. 746, Taf. 15, Fig. 10.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 173.

Locality: Nopporo (1 female, S. SAITO, August 17, 1933).
Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.50	0.30	1.60	1.10	0.70	1.00

Female: Carapace 0.21 cm. long, 0.13 cm. wide between second and third coxae. Viewed from above, anterior row of eyes recurved, posterior row procurved. All eyes nearly equal in size, but posterior lateral eyes somewhat smaller than the others. Anterior median eyes separated from each other by 1/3 of their diameter, from anterior lateral eyes by their diameter. Posterior median eyes situated on black tubercles, nocturnal, separated from each other by 7/5 of their diameter, from posterior lateral eyes by their diameter. Lateral eyes of both rows situated on a tubercle and contiguous. Quadrangle wider behind than in front in ratio 16 : 11, more long than wide in ratio 3 : 2. Clypeus equal to 8/5 of the diameter of anterior median eyes. Chelicerae comparatively long, furnished with six teeth on anterior margin of claw-furrow. Labium almost rectangular in shape, more wide than long in ratio 2 : 1. It does not reach the middle of maxillae. Maxillae somewhat wider in front than at base, more long than wide in front in ratio 2 : 1. Sternum nearly triangular in shape, convex, bluntly ending posteriorly, straight in front. First coxae wide apart, fourth coxae separated by their width.

Colour in life: Carapace light brown with sepia submarginal stripes. Chelicerae brown. Maxillae paler than chelicerae. Labium deep sepia with white tip. Sternum deep sepia. Palpi and legs greenish yellow. Abdomen dark yellow with white spots and five pairs of black spots. Belly pale black.

Distribution: Japan (?)[1]

2. Genus *Oedothorax* BERTKAU, 1883

38. *Oedothorax trilineatus* n. sp. Jap. name, *Misuji-akaneguma.*

Pl. XIII, Fig. 18. Dorsal view of female.

Pl. XV, Fig. 61, a. Eyegroup. b. Epigynum.

Locality: Nemuro (4 females, S. MOTODA, July 15, 1931).

Measurements:

1). L. KOCH gave a description without locality while W. BÖSENBERG and E. STRAND failed the collection from Japan.

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.15	0.10	0.13	0.11	0.13	0.15
female	0.14	0.11	0.13	0.10	0.11	0.12
female	0.14	0.10	0.14	0.10	0.13	0.14
female	0.13	0.10	0.12	0.11	0.10	0.12

Female: Carapace very small. Eight eyes in two rows. Viewed from above, anterior row recurved, its eyes equal in size and equidistant, separated by their diameter. Posterior row slightly procurved, its eyes equidistant, separated by three times the radius of its median eyes which largest in eight eyes. Posterior lateral eyes smaller than anterior eyes. Eye ratio 4 : 3 : 2. Quadrangle square, as wide as long. Clypeus equal to the width of quadrangle of median eyes. Chelicerae weak, divergent, with weak fangs. Labium oval, rounded anteriorly, much wider than long in ratio 2 : 1. It does not reach the middle of maxillae. Maxillae almost triangular, much wider in front than at base, with parallel inner margins. Sternum oval, narrowed anteriorly to width of labium, bluntly ending between fourth coxae.

Colour in alcohol: Carapace black, but pars thoracica deeper than pars cephalica. Chelicerae, maxillae, labium and sternum black. Legs and palpi white, annulated with black. Abdomen black with three oblique white markings at the sides. Belly black uniformly.

Remarks: The spider is allied to *Oedothorax femineus* Bös. et STRAND, but it differs in colour and in abdominal markings from the brown body of the latter.

Family VIII. *MICRYPHANTIDAE*

This family intergrades with the Linyphiidae, the Theridiidae and the Argiopidae, and in consequence some genera of this family are united in the above families by certain authors. In extreme cases this family is quite neglected as by A. PETRUNKEVITCH (Systema Aranearum, Trans. Connect. Acad. Arts and Sc., Vol. 29, 1929).

1. Genus ***Nesticus*** THORELL, 1870

39. ***Nesticus cericeus*** n. sp. Jap. name, *Kinu-gumo.*

Pl. XIII, Fig. 19. Dorsal view of female.

Pl. XV, Fig. 62, a. Eyegroup. b. Epigynum.

Locality: Soranuma (1 female, S. MAKINO, Sept. 8, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.47	0.32	1.03	0.98	0.79	0.93

Female: Carapace 0.23 cm. long, 0.14 cm. wide between second and third coxae, with indefinite median furrow, without cervical groove. Eight eyes in two rows, black in colour. Anterior eyes much smaller in diameter than posterior eyes in ratio 2 : 1. Anterior median eyes separated from each other by their radius, from anterior lateral eyes by twice their diameter. Posterior eyes equidistant, separated by their diameter. Lateral eyes of both rows contiguous. Quadrangle wider behind than in front in ratio 5 : 3, somewhat more long than posterior width. Clypeus equal to the width of eye-region. Chelicerae relatively long, furnished with five teeth on the lower margin of claw-furrow. Labium triangular, more wide than long in ratio 5 : 3, bluntly ending anteriorly. It does not reach the middle of maxillae. Maxillae much wider in front than at base in ratio 3 : 1, more long than wide in front. Sternum almost triangular, with concave anterior margin, pointed between fourth coxae which is separated by their width.

Colour in alcohol: Carapace yellow with a median longitudinal and marginal black stripes at pars thoracica. Chelicerae yellow with brown ends. Sternum dark yellow. Maxillae, labium and palpi yellow. Legs yellow, with black ends of femora, tibiae, metatarsi and tarsi. Abdomen dull crimson red with a dark median longitudinal leaf-marking. Belly dull yellow.

Remarks; The spider is closely allied to *Nesticus cellulanus* CLERCK, but it is distinguished from the latter by the crimson red of the abdomen together with the absence of a pair of black stripes at the belly.

Family IX. *ARGIOPIDAE*

The limits of this family as used here are the same as in the paper by R. BREMEN (Tierwelt Mitteleuropas, Leipzig, Bd. 3), therefore, it is confined within narrower limits than the common system. Five genera are represented in the fauna of Hokkaido, which can be distinguished by the following table.

1. a. Lateral condyle of the chelicerae wanting. .... 2.
   b. Lateral condyle of the chelicerae distinct. .... 3.

2\. a. Posterior femora with a single or double fringe of hairs on the external face of the basal half. .... 1. Gen. *Leucauge* WHITE
b. Posterior femora not fringed. .... 3. Gen. *Meta* C. L. KOCH
3\. a. Posterior row of eyes strongly procurved. ...... 2. Gen. *Argiope* AUD.
b. Posterior row of eyes barely procurved. .... 4.
4\. a. Abdomen with several humps. .... 4. Gen. *Cyclosa* MENGE
b. Abdomen without hump. .... 5. Gen. *Araneus* L.

1. Genus **Leucauge** WHITE, 1841

40. ***Leucauge subblanda*** BÖS. et STRAND

Leucauge subblanda, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 184, Taf. 15, Fig. 406.

Locality: Yakumo (8 females, S. SAITO, July 24, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.80	0.65	1.80	1.40	0.80	1.20
female	0.80	0.60	1.90	1.50	0.80	1.20
female	0.80	0.70	1.50	1.20	0.70	1.10
female	0.70	0.50	2.00	1.50	0.80	1.30
female	0.80	0.60	2.00	1.70	0.80	1.40
female	0.90	0.60	1.70	1.40	0.80	1.20
female	0.90	0.70	2.10	1.70	0.90	1.20
female	0.60	0.30	1.60	1.20	0.80	1.00

Female: Carapace 0.32 cm. long, 0.23 cm. wide between second and third coxae, flat, with a definite cervical and transverse median furrows. Eight eyes in two rows, equal in size. Anterior row recurved and posterior row straight. Anterior median eyes separated from each other by 1/4 of their diameter, from anterior lateral eyes by 7/3 of their diameter. Posterior median eyes separated from each other by their diameter, from posterior lateral eyes by almost twice their diameter. Lateral eyes of both rows contiguous. Quadrangle wider behind than in front in ratio 4 : 3, longer than the posterior width in ratio 5 : 4. Clypeus equal to the diameter of eyes. Chelicerae cone-shaped, vertical, with strong fang. Labium more wide than long in ratio 3 : 2, rounded anteriorly. It does not reach the middle of maxillae. Maxillae wider in front than at base in ratio 3 : 2, more long than wide in front in ratio 2 : 1. Sternum heart-shaped, as long as wide, with concave anterior margin, pointed posteriorly between fourth coxae which are almost contiguous.

Colour in life: Carapace dull white with black marginal line and dull brown colour along cervical and median furrows. Chelicerae brown with black claw. Maxillae and labium brown. Sternum brown with black fringe. Palpi and legs dull brown, but femora and patellae of the first and second legs dull green. Abdomen yellow with a black leaf-marking, which is ornamented with silver spots. Belly black with a pair of silver stripe from spinnerets to spiracles.

Distribution: Japan (Kyushu).

41. *Leucauge blanda* L. KOCH

Leucauge blanda, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 182, Taf. 3, Fig. 8, Taf. 15, Fig. 394.; S. YUHARA:—Study of Spiders (in Japanese), Tokyo, 1930, p. 115, Fig. 44.

Meta blanda, L. KOCH:—Verhandl. d. k. k. zool. bot. Ges., Bd. 27, 1877, p. 743, Taf. 15, Fig. 5.

Locality: Nopporo (1 female, S. SAITO, August 17, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.60	0.45	1.50	1.20	0.80	0.95

Female: Carapace 0.30 cm. long, 0.21 cm. wide between second and third coxae. Viewed from above, anterior row of eyes recurved, posterior row straight. Posterior eyes nocturnal, somewhat larger than the anterior eyes. Anterior median eyes separated from each other by their radius, from anterior lateral eyes by three times their diameter. Posterior median eyes separated from each other by their diameter, from posterior lateral eyes by three times their diameter. Lateral eyes of both rows contiguous. Quadrangle wider behind than in front ratio 6 : 5, more long than wide. Clypeus equal to the diameter of anterior median eyes. Chelicerae strong, vertical. Labium triangle in shape, more wide than long in ratio 3 : 2. Maxillae square, somewhat wider in front than at base. Sternum almost triangular in shape, as wide as long, pointed behind between the fourth coxae which are separated by 1/3 of their width.

Colour in life: Carapace light brown. Chelicerae deeper than carapace. Labium and maxillae yellowish brown. Sternum blackish brown. Palpi and legs dull yellow. Abdomen dull yellow with a median silver band which is ornamented with black leaf-marking. Belly blackish brown with a paler median band which is bordered with greenish silver stripe. Spinnerets black.

Distribution: Japan (Honshu, Kyushu).

2. Genus ***Argiope*** Audouin, 1827

42. ***Argiope Brünnichi*** (Scopoli)

Argiope Brünnichi, T. Thorell:—Rem. on Syn., Upsala, 1870–1873, p. 518.; W. Bösenberg:—Zoologica, Stuttgart, 1903, Bd. 14, p. 20, Taf. 1, Fig. 1.; W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1905, p. 196, Taf. 4, Fig. 23, Taf. 12, Fig. 297, 300.

Locality: Bankenuma (1 female, G. Hayashi, Sept. 19, 1930). Sapporo (1 female, H. Yamaguchi, Oct. 17, 1930). Soranuma (1 female, S. Makino, Sept. 8, 1931).

Measurements:—

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Bankenuma)	1.90	1.50	2.80	2.60	1.50	2.50
female (Sapporo)	1.85	1.45	2.70	2.50	1.60	2.50
female (Soranuma)	1.35	1.07	1.87	1.74	0.93	1.60

Female: Carapace 0.58 cm. long, 0.43 cm. wide between second and third coxae, with a definite cervical groove. Eyes eight, typical, in two rows. Abdomen yellow, clossed by a great number of black transverse lines. Carapace covered with white hairs through which dark markings on the sides show indistinctly.

Distribution: Europe, Japan (Honshu, Kyushu).

43. ***Argiope aurea*** n. sp. Jap. name, *Kin-koganegumo.*

Pl. XIII, Fig. 20. Dorsal view of female.

Pl. XV, Fig. 63, a. Epigynum from above. b. Sideview of epigynum.

Locality: Mt. Kurotake (1 female, Dr. T. Uchida, August 1, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	1.00	0.80	1.70	1.30	0.80	1.30

Female: Carapace 0.40 cm. long, 0.30 cm. wide between second and third coxae, 0.25 cm. wide in the region of the eyes. Radial groove wanting, but pars cephalica clearly delimited by the cervical groove. Viewed from above, first row of eyes strongly recurved, second row slightly procurved, and a very little shorter than the anterior ones. All eyes equal in size. Posterior median eyes separated from each other by their diameter,

and from posterior lateral eyes by six times their diameter. Anterior median eyes separated from each other by four times the diameter, from anterior laterals by six times. Laterals contiguous. Quadrangle wider in front than behind in ratio 5 : 3, as long as wide. Clypeus equal to the diameter of eyes. Chelicerae strongly convex in front, cone-shaped, with weak condyle. Labium more wide than long in ratio 5 : 2. Maxillae convex, wider toward end, as long as wide. Sternum convex, triangular, strongly rebordered, more long than wide in ratio 5 : 4, widest at first and second coxae, pointed between fourth coxae. Abdomen oblong oval, with obvious shoulder hump.

Colour in alcohol: Carapace dull yellow with a median longitudinal black band. Chelicerae dull yellow with deep brown condyle and black fang. Labium and maxillae yellow at the termination, black at basal part. Sternum black with yellow fringe. Legs yellow annulated with sepia. Abdomen buff above with four black muscular points, weak black mesh, and brown lines at posterior part. Belly dull yellow, black in middle, forming a mid-ventral band bordered by a row of white spots. Spinnerets black.

Remarks: This species is allied to *Argiope sachalinensis* SAITO[1] which inhabits Saghalien, but it is distinguished by the presence of shoulder hump, the form of epigynum and the colour of abdomen.

3. Genus *Meta* C. L. KOCH, 1836

44. *Meta yunohamaensis*, BÖS. et STRAND

Jap. name, *Yunohama-doyogumo*.

Meta yunohamaensis, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 180, Taf, 11, Fig. 225, 229.; T. KAMBE:—Jour. Chosen Nat. Hist. Soc., (in Japanese) No. 15, 1933, p. 44; S. SAITO:—Transact. Sapporo Nat. Hist. Soc., Vol. 13, 1933, p. 48, pl. 3, Fig. 12.; ———:—Proc. Imp. Acad., Vol. 9, 1933, p. 273.; ———:—Transact. Sapporo Nat. Hist. Soc., Vol. 13, 1934, p. 33.

Locality: Sapporo (1 male, 3 females, S. SAITO, Oct. 25, 1929, May 20, 1932, Nov. 28, 1933.; Dr. T. INUKAI, Nov. 7, 1931). Vicinity of Sapporo (1 male, S. SAITO, Apr. 29, 1930). Mt. Yubari (1 female, T. ITABASHI, July 8, 1930). Nemuro (2 females, S. MOTODA, July 15, 1931). Yakumo (2 females, S. SAITO, July 24, 1931). Mt. Daisetsu (2 females, S. NISHIO, Aug. 1–5, 1932). Ishikiriyama (1 immature male, 1 female M. TERUI, Aug., 1932). Mt. Akan (1 female, Dr. T. INUKAI, July, 1933).

Measurements:

1) S. SAITO:—Transact. Sapporo Nat. Hist. Soc., Vol. 13, 1934, p. 332, Fig. 6.

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Mt. Akan)	1.00	0.70	1.60	1.20	0.70	1.20
female (Nemuro)	0.70	0.55	1.49	1.18	0.59	0.83
female (Nemuro)	0.77	0.62	1.46	1.18	6.75	0.99
female (Yakumo)	1.00	0.75	2.20	1.60	0.90	1.30
female (Yakumo)	0.90	0.60	2.10	1.50	0.80	1.30
female (Mt. Yubari)	1.00	0.80	2.20	1.70	0.90	1.30
female (Mt. Daisetsu)	1.10	0.80	2.00	1.60	1.00	1.50
female (Mt. Daisetsu)	0.90	0.70	2.00	1.50	0.90	1.30
female (Sapporo)	0.45	0.30	1.10	0.90	0.50	0.70
female (Sapporo)	0.53	0.39	1.28	0.99	0.56	0.76
female (Sapporo)	0.75	0.50	1.75	1.20	0.70	1.10
male (Sapporo)	0.40	0.32	0.70	0.65	0.25	0.40
male (Sapporo)	0.74	0.52	1.29	0.95	0.78	0.81

Female: Carapace 0.38 cm. long, 0.26 cm. wide between second and third coxae. Viewed from above, anterior row of eyes recurved, posterior row straight. Posterior median eyes separated from each other by their diameter, from the posterior laterals by the same interval, somewhat larger than the others which are equal in size. Eyes of anterior row equidistant separated by 23/30 of their diameter. Laterals of both rows contiguous. Quadrangle somewhat wider behind than in front in ratio 13 : 12, as wide as long. Clypeus narrow, practically wanting. Chelicerae moderately long and strong, with parallel outer margins. Labium oval, more wide than long in ratio 5 : 4. Maxillae much wider in front than at base in ratio 2 : 1. Sternum triangular, convex, bluntly ending between the fourth coxae which are separated by their width.

Colour in life: Carapace brownish yellow with a sepia marking at median part and at margin. Chelicerae, maxillae and labium brown. Sternum black. Legs and palpi dull yellow. Abdomen white or dull yellow with a leaf-marking. Belly sepia with a pair of white stripe from spinnerets to both spiracles.

Male: Colour brighter than that of female. Carapace, legs and palpi green or light brown. The leaf-marking of abdomen brown.

Distribution: Japan (Formosa, Kyushu, Honshu. Korea, Southern Saghalien).

4. Genus ***Cyclosa*** Menge, 1866

45. ***Cyclosa atrata*** Bös. et Strand

Pl. XIII, Fig. 21, a. Dorsal view of female. b. Sideview of female.

Cyclosa atrata, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 204. Taf. 4, Fig. 28, Taf. 15, Fig. 417.

Locality: Sapporo (1 female, August 14, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	1.00	0.70	1.00	0.90	0.70	0.90

Female: Carapace 0.29 cm. long, 0.17 cm. wide between second and third coxae with indefinite cervical and median furrows. Eyes eight, in two rows. Viewed from above, both rows strongly recurved. Anterior eyes larger than posterior eyes in ratio 3 : 2. A straight line can be drawn through the posterior edges of posterior median eyes and the anterior edges of anterior lateral eyes. Anterior eyes equidistant, separated by 17/11 of their diameter. Posterior median eyes in contact with each other, separated from posterior lateral eyes by about four times their diameter. Lateral eyes of both rows contiguous. Quadrangle wider in front than behind in ratio 17 : 7, as long as wide behind. Clypeus equal to the diameter of anterior eyes. Chelicerae short but strong. Labium triangular, as long as wide at base. Maxillae wider at end than at base in ratio 2 : 1, as long as wide in front. Sternum triangular, broadly truncated anteriorly, pointed behind between fourth coxae which are separated by their width. Abdomen slender, the hind part prolonged, with three hind projections, one in median line on the ventral side and one on each side.

Colour in life: Carapace, chelicerae, maxillae labium and sternum deep sepia. Palpi and legs pale yellow, but femora and patellae deep yellow, coxae and trochanters brown. Abdomen deep sepia with a pair of stripes of silver spots. This stripe branching toward outside and cutting at 1/3 from behind. Belly paler than carapace.

Distribution: Japan (Kyushu).

5. Genus ***Araneus*** LINNAEUS, 1759

46. ***Araneus marmoreus*** CLERCK

Araneus *marmoreus*, O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 15.; A. PETRUNKEVITCH:—Bull. Amer. Mus. Nat., Hist., Vol. 29, 1911, p. 341.; W. RABELER:—Zeitschr. f. Morph. u. Oekol., Bd. 21, 1931, p. 198.; S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 336.

Araneus *marmorea*, J. H. EMERTON:—Trans. Connect. Acad., Vol. 6, 1884, p. 307.; C. R. CROSBY and S. C. BISHOP:—Memoir Cornell Univ. Agr. Exper., 1926, p. 1053.; S. SAITO: Annot. Zool. Japonensis, Vol. 13, 1932, p. 379, Fig. 1.

Aranea marmorea, C. FABRICIUS:—Syst. Ent., Tom. 2, 1793, p. 415
Aranea marmorea (Aranea Rajii), T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 9.
Epeira marmorea, E. SIMON:—Arachn. de France, Paris, Tom. 1, 1874, p. 76.; L. KOCH:—Arachn. Sibirien u. Novaja Semlja, Stockholm, 1879, p. 5.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 130, Taf. 5, Fig. 15.; C. McCOOK:—Amer. Spiders, 1893, Vol. 3, p. 143, pl. 1, Fig. 1, 2, pl. 2, Fig. 1, 2, pl. 3. Fig. 7, 8.; J. H. EMERTON:—Common Spiders, London. 1902, p. 169, Fig. 398, 399.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 24, Taf. 1, Fig. 4.
Aranea Radii, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 236.
Epeira scalaris, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 331, pl. 24, Fig. 240.
Epeira insularis, E. KEYSERLING:—Spinnen Amerikas, Epeiridae, 1892, p. 170, pl. 8, Fig. 126. N. M. HENTZ:—Spiders U. S., Boston, 1875, p. 109, pl. 2, Fig. 11.
Epeira Radii, T. THORELL:—Südrussischer Spinnen, St. Petersburg, 1875, p. 15.

Locality: Sapporo (1 male, 7 females, S. SAITO, Sept. 21, 1929). Shiranuka (1 immature female, M. L. PEELLE, July 31, 1931). Shikaribetsu (1 female. S. SAITO, August 3, 1931). Akkeshi (1 female, Y. HADA, Nov. 3, 1931). Kushiro (4 immature females, S. MOTODA, July 15–18, 1932). Makomanai (1 female, S. SAITO, Sept. 18, 1932). Mt. Akan (1 male, 1 female, Dr. T. INUKAI, July, Aug., 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Sapporo)	0.80	0.40	1.50	1.30	1.00	1.20
male (Mt Akan)	1.20	0.70	2.70	2.30	1.60	2.20
female (Mt. Akan)	1.70	1.30	2.60	2.40	1.50	2.20
female (Sapporo)	1.50	1.10	2.30	2.10	1.30	2.00
female (Sapporo)	1.00	0.90	1.70	1.50	1.00	1.50
female (Shikaribetsu)	1.80	1.60	2.50	2.30	1.60	2.25
female (Akkeshi)	1.30	0.90	2.60	2.50	1.70	2.40
female (Makomanai)	1.90	1.50	2.90	2.60	1.70	2.50

Female: Carapace 0.60 cm. long, 0.52 cm. wide between second and third coxae, with a definite cervical groove. Eyes in two recurved rows. The separation of both rows at the median eye-region greater than a half of that between two anterior median eyes while the lateral eyes of both rows contiguous. Legs vigorous, furnished with short grey hairs and vigorous black bristles. Sternum oval, pointed behind.

Colour in life: Carapace dull yellow. Palpi and legs similar in colour to the thorax with dark brown at the termination of each segment. Sternum brown. Abdomen bright yellow with complicated black markings. Anterior abdomen with a shamrock leaf shaped marking on the upper side on the middle line, on both sides of which there are four black muscle

impressions. Posterior abdomen ornamented with a folium and spots at its periphery, the number of which are variable. Belly dark with a black longitudinal band at the median part.

Male: Carapace 0.45 cm. long, 0.40 cm. wide between second and third coxae. Abdomen relatively smaller than that of female. Tibia of the second leg furnished with six pairs of strong spines on the inner side.

Distribution: Canada, U. S. A., Siberia, France, Germany, Hungary, England, Japan (Southern Saghalien).

47. ***Araneus quadratus*** CLERCK

Pl. XV, Fig. 64, a. Sideview of epigynum. b. Epigynum from above. c. Eyegroup.

Araneus quadratus, O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 16.; A. PETRUNKEVITCH:—Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 311.; S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 337.

Epeira quadrata, E. SIMON:—Arachn, de France, Paris, Tom. 1, 1874, p. 80.; J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 324, pl. 23, Fig. 236.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 130, Taf. 5, Fig. 12.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 23, Taf. 1, Fig. 3.

Locality: Vicinity of Sapporo (5 females, 1 immature female, S. SAITO, July 3, 6, August 10, 1930). Ishikiriyama (2 females, M. TERUI, August 1932). Nopporo (2 females, S. SAITO, Aug. 17, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Sapporo)	1.90	1.50	3.00	2.50	1.50	2.40
female (Sapporo)	2.00	1.60	3.00	2.80	1.90	2.70
female (Sapporo)	1.55	1.30	2.30	2.00	1.40	1.80
female (Sapporo)	1.70	1.20	2.70	2.30	1.60	2.50
female (Sapporo)	1.40	1.10	2.30	2.20	1.30	2.00
female (Ishikiriyama)	1.50	1.30	2.00	1.80	1.50	1.70
female (Ishikiriyama)	1.30	1.10	1.90	1.80	1.20	1.70
female (Nopporo)	2.00	1.60	3.20	2.90	1.70	2.80
female (Nopporo)	1.60	1.20	2.60	2.40	1.70	2.30

Female: Carapace 0.80 cm. long, 0.62 cm. wide between second and third coxae. Eight eyes in typical arrangement, equal in size. Viewed from above, both rows recurved. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by 4.5 times their diameter. Posterior median eyes separated from each other by 1/4 of their diameter, from posterior lateral eyes by five times their diameter. Lateral

eyes of both rows contiguous. Quadrangle wider in front than behind in ratio 4 : 3, more long than wide in ratio 6 : 5. Clypeus equal to the length of quadrangle of median eyes. Chelicerae vigorous, vertical and cone-shaped. Labium oval, *more wide than long in ratio 7 : 5, reaching* middle of maxillae. Sternum shield-shaped, with concave anterior margin, bluntly pointed between the contiguous fourth coxae.

Colour in life: Carapace pale yellow with median dark stripe and submarginal dark stripes. Chelicerae deeper than carapace. Labium and sternum black. Maxillae black with white anterior margins. Palpi and legs yellow, annulated with black on all ends of all joints. Abdomen reddish brown with yellow dots which are bordered with deep brown and arranged somewhat regularly. Belly reddish brown.

Distribution: Greenland, France, Germany, Hungary, England, Japan (Southern Saghalien).

48. *Araneus undatus* OLIVIER

Aranea undata (*sclopetaria* CL.), W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 228.

Araneus sericatus, A. PETRUNKEVITCH:—Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 315.

Araneus sericata, J. H. COMSTOCK:—Spider Book, New York, 1913, p. 487.

Epeira sclopetaria, MENGE:—Preuss. Spinnen, p. 59. pl. 7, Fig. 7.; J. BLACKWALL:—Ann. Mag. Nat. Hist., 4 ser., 1871, Vol. 8, p. 429.; J. H. EMERTON:—Common Spiders, Boston, 1902, p. 160, Fig. 383.

Epeira sericata, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 328, pl. 23, Fig. 238.

Locality: *Yakumo* (*1 male*, S. SAITO, *July 24, 1931*). *Shiranuka* (1 male, 5 immature females, M. L. PEELLE, July 31, 1931). Mt. Akan (1 male, 3 females, Dr. T. INUKAI, July 11-12, 1932). Lake Kussharo (1 male, S. NISHIO, July 15-18, 1932). Ishikiriyama (1 immature female, M. TERUI, August, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Yakumo)	0.65	0.40	1.50	1.20	0.70	1.00
male (Shiranuka)	0.70	0.40	1.30	1.00	0.80	1.00
male (Kussharo)	0.70	0.50	1.20	1.10	0.80	0.90
male (Mt. Akan)	0.40	0.30	0.60	0.58	0.32	0.52
female (Mt. Akan)	0.75	0.68	1.02	0.82	0.60	0.85
female (Mt. Akan)	0.67	0.52	0.78	0.68	0.42	0.62

Female: *Carapace 0.28 cm. long, 0.22 cm. wide between second and* third coxae. Arrangement of eyes typical. Viewed from above, anterior

row of eyes slightly recurved, posterior row nearly straight. Posterior median eyes somewhat larger than the others, nocturnal, separated from each other by their radius, from posterior lateral eyes by about four times their diameter. Anterior eyes almost equidistant, separated from each other by two times their diameter. Lateral eyes of both rows contiguous. Clypeus equal to the radius of anterior eye. Chelicerae of moderate size, strong, with a weak-developed condyle. Labium more wide than long in ratio 4 : 3, rounded anteriorly. It does not reach the middle of maxillae. Maxillae almost square in shape, with parallel truncature and parallel outer margins. Sternum convex, with concave anterior margin, pointed behind between fourth coxae which are almost contiguous. First coxae wide apart.

Colour in alcohol: Carapace dull brown. Chelicerae deep brown with black ends. Labium black with white tip. Maxillae blackish brown with white inner margins. Sternum black. Palpi and legs pale brown, annulated indefinitely with brown on all joints. Abdomen dull brown or brownish white with a black or sepia leaf-marking which is broken at the edge just in front of the middle on each side, so as to form two separate figures, one covering the front and the other the back half of the abdomen. Belly sepia or black with a pair of white stripes from spiracles to spinnerets which black.

Male: Abdomen comparatively smaller than that of female, and the other characters and colour as in female.

Remarks: A. PETRUNKEVITCH says that *Epeira frondosa* WALCKENAER is a synonym of this species (Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 742), but it is a synonym of a quite different species, *Araneus cornutus* CLERCK.

Distribution: U. S. A., France, Hungary, Germany, England, Siberia, Japan (Yeso). This species has already been reported from Hokkaido by W. BÖSENBERG and E. STRAND in their "Japanische Spinnen".

49. ***Araneus cornutus*** CLERCK

Araneus cornutus, A. PETRUNKÉVITCH:—Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 742.; S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 334.

Aranea cornuta, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 236.

Araneus frondosa, J. H. COMSTOCK:—Spider Book, New York, 1913, p. 489.

Araneus foliatus, S. SAITO:—Proc. Imper. Academy, Vol. 9, 1933, p. 273.

Aranea foliata, R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 111, 115, Taf. 23, Fig. 1253, Taf. 24, Fig. 1299.

Epeira cornuta, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 15.; E. SIMON:—Arachn. de France, Paris, Tom. 1, 1874, p. 108.; T. THORELL:—Südrussischer Spinnen, St. Petersburg, 1875, p. 16.; L. KOCH:—Arachn. Sibirien Novaja Semlja, Stockholm, 1879,

p. 5. ; O. HERMAN :—Ungarns Spinnen-Fauna, Budapest, 1879, Bd. 3, p. 17. ; C. CHYZER et L. KULCZYNSKI :—Araneae Hungariae, Budapest, 1891, Tom. 1, p. 133, *Taf.* 5, *Fig.* 9.

Epeira strix, N. M. HENTZ :—Spiders U. S., Boston, 1875, p. 112, pl. 13, Fig. 5. ; J. H. EMERTON— : Common Spiders, London, 1902, p. 160, Fig. 385.

Epeira affinis, J. BLACKWALL :—Ann. Mag. Nat. Hist., 1844, Vol. 18, p. 77.

Epeira apoclisa, J. BLACKWALL :—Spid. Gr. Brit. & Ir., London, 1864, p. 325, Fig. 237.

Locality: Sapporo (6 females, S. SAITO, Sept. 10, 1930, June 23, 1931).

Measurements :

	total length	abdomen	leg I	leg II	leg III	leg IV
female	1.10	0.70	1.40	1.20	0.80	1.20
female	1.20	0.90	1.45	1.25	0.75	1.15
female	1.05	0.80	1.15	1.00	0.65	0.95
female	1.00	0.75	1.25	1.15	0.70	1.00
female	0.95	0.85	1.20	1.00	0.60	0.80
female	1.20	0.90	1.45	1.25	0.80	1.15

Female. Carapace 0.43 cm. long, 0.35 cm. wide between second and third coxae. Eyes eight in two rows, black. Viewed from above, anterior row slightly recurved, posterior row almost straight. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by three times their diameter. Posterior median eyes separated from each other by 3/4 of their diameter, from posterior lateral eyes by four times their diameter. Lateral eyes of both rows contiguous. Quadrangle almost square in shape, but somewhat wider in front than behind. Clypeus practically wanting. Chelicerae strong, cone-shaped, with well-developed condyles. Labium wider than long in ratio 4 : 3, rounded anteriorly. Maxillae more long than wide in ratio 5 : 3, wider in front than at base in ratio 3 : 2. Sternum shield-shaped, pointed behind, with concave anterior margin. First coxae wide apart, fourth coxae contiguous.

Colour in life : Carapace yellowish brown. Chelicerae blackish brown. Maxillae and labium pale black with white margin. Sternum blackish brown, but deeper than the chelicerae. Palpi and legs yellow with black ring at the end of every joint. Abdomen white with a blackish brown leaf-marking. Belly yellowish brown with a dark band bordered with white stripe which extends from spinnerets to spiracles.

Distribution: U. S. A., Europe, Japan (Southern Saghalien).

50. ***Araneus patagiatus*** CLERCK

Araneus patagiatus, A. PETRUNKEVITCH :—Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 803. ;

W. RABELER:—Zeitschr. f. Morph. u. Oekol., Bd. 21, 1931, p. 198.; S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1924, p. 334.

Araneus patagiata, L. KOCH:—Arachn. Sibirien Novaja Semlja, Stockholm, 1879, p. 7.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 35, Taf. 2, Fig. 22.; C. R. CROSBY and S. C. BISHOP:—Memoir Cornell Univ. Agr. Exper. Station, 1926, p. 1053.; S. SAITO:—Ann. Zool. Jap., Vol. 13, 1932, p. 380, Fig. 2.; M. L. PEELLE and S. SAITO:—Jour. Faculty Sc. Hokkaido Imper. Univ., 6 ser., Vol. 2, 1932, p. 92.; S. SAITO:—Proc. Imper. Academy, Vol. 9, 1933, p. 273.; T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 16.

Epeira patagiata, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 329, pl. 24, Fig. 229.; MENGE:—Preuss. Spinnen, 1866, Vol. 1, p. 10, pl. 8, Fig. 9; E. SIMON:—Arachn. de France, Paris, Tom. 1, 1874, p. 110.; T. THORELL:—Südrussischer Spinnen, St. Petersburg, 1875, p. 16.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 113, Taf. 5, Fig. 1c.; J. EMERTON:—Common Spiders, London, 1902, p. 160, Fig. 384.

Aranea ocellata, J. H. COMSTOCK:—Spider Book, New York, 1913, p. 489.

Locality: Soranuma (1 male, 1 female, S. MAKINO, Sept. 8, 1931). Mt. Akan (1 female, Dr. T. INUKAI, July, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Soranuma)	0.42	0.29	0.58	0.47	0.33	0.44
female (Soranuma)	0.60	0.44	0.89	0.70	0.52	0.76
female (Mt. Akan)	0.90	0.65	1.20	1.10	0.70	0.95

Female: Carapace 0.36 cm. long, 0.32 cm. wide between second and third coxae. Eyes in two rows, equal in size. Anterior row of eyes slightly recurved, posterior row straight. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by four times their diameter. Posterior median eyes separated from each other by their radius. Lateral eyes of both rows contiguous. Quadrangle wider in front than behind in ratio 6 : 5. Clypeus practically wanting. Chelicerae cone-shaped, strong, with weak-developed condyles. Labium triangular, as wide as long. Maxillae square in shape, wider in front than at base in ratio 2 : 1. Sternum shield-shaped, more long than wide in ratio 5 : 4, straight anterior margin and bluntly pointed posteriorly. Second coxae most widely apart, fourth coxae separated by 1/2 of their width.

Colour in alcohol: Carapace dull brown, furnished with black hairs. Chelicerae blackish brown. Maxillae and labium brown with light tips. Sternum blackish brown. Palpi and legs deep brown. Abdomen deep brown with a leaf-marking. Belly blackish brown with a pair of white tripes from both spiracles to median part of abdomen

Distribution: U. S. A., Siberia, Japan (Southern Saghalien, Iturup),

Germany, France, Hungary, England.

51. ***Araneus tokachianus*** n. sp. Jap. name, *Tokachi-onigumo.*

Pl. XIII, Fig. 22. Dorsal view of female.

Pl. XV, Fig. 65. Epigynum from above.

Locality: Mt. Tokachi (1 female, S. SAITO, August 29, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.70	0.50	0.85	0.80	0.50	0.80

Female: Carapace 0.27 cm. long, 0.21 cm. wide between second and third coxae, with definite cervical and median furrows. Eyes eight, typical, in two rows, both of which are slightly recurved. Median eyes somewhat larger than the laterals. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by twice their diameter. Posterior median eyes separated from each other by their radius and from posterior lateral eyes by three times their diameter. Lateral eyes of both rows contiguous. Quadrangle wider in front than behind in ratio 6 : 5. Clypeus practically wanting. Chelicerae relatively weak, with convergent outer margins. Labium almost circular, as wide as long. Sternum shield-shaped, with straight anterior margin and pointed posterior end. Maxillae rounded anteriorly, as wide as long, with parallel inner margins. The first coxae wide apart, fourth coxae subcontiguous.

Colour in alcohol: Carapace dull white with dark colour on pars cephalica. Chelicerae dull yellow. Maxillae and labium paler than chelicerae. Sternum blackish yellow. Palpi and legs dull white with sepia at the ends of all joints and sepia patch on femora and tibiae. Abdomen dull white, with a median leaf-marking. Sides sepia. Belly sepia with a median black band bordered by a stripe of white spots.

Remarks: The species is easily distinguishable from the other species of the genus by the form of the epigynum.

52. ***Araneus triguttatus*** FABRICIUS

Pl. XIII, Fig. 23, a, b. Dorsal view of female.

Pl. XV, Fig. 66. Epigynum from above.

Araneus triguttatus, S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 336.
Aranea triguttata, C. FABRICIUS:—Syst. Ent., Tom. 2, 1793, p. 416.
Epeira triguttata, E. SIMON:—Arachn. de France, Paris, Tom. 1, 1874, p. 88.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 131, Taf. 5, Fig. 6.;

W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 38, Taf. 2, Fig. 25.
Epeira triguttata var. *agelena*, T. THORELL:—Südrussischer Spinnen, St. Petersburg, 1875, p. 16.
Aranea guttata, R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 113, 114, Taf. 23, Fig. 1270, Taf. 24, Fig. 1285.
Epeira agalena, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 334, pl. 24, Fig. 242.; ———:—Ann. Mag. Nat. Hist., 2 ser., Vol. 14, p. 32.

Locality: Mt. Tokachi (1 female, S. SAITO, August 29, 1931). Vicinity of Sapporo (1 female, M. SHIRATO, July 10, 1932). Mt. Akan (2 females, Dr. T. INUKAI, July, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Mt. Tokachi)	0.60	0.45	0.80	0.70	0.50	0.70
female (Sapporo)	0.50	0.40	0.70	0.60	0.50	0.70
female (Mt. Akan)	0.60	0.50	0.90	0.70	0.50	0.65
female (Mt. Akan)	0.60	0.50	0.75	0.60	0.40	0.65

Female: Carapace 0.24 cm. long, 0.21 cm. wide between second and third coxae. All eyes equal in size. Viewed from above, the anterior row of eyes recurved, the posterior row nearly straight. Anterior median eyes separated from each other by about two times their diameter, from anterior lateral eyes by four times their diameter. Posterior median eyes separated from each other by three times their radius, from the posterior laterals by nine times their radius. Lateral eyes of both rows contiguous. Quadrangle wider in front than behind in ratio 4 : 3, as long as wide. Clypeus equal to the diameter of eyes. Chelicerae moderately long and strong, with parallel outer edges. Labium triangular, more wide than long in ratio 3 : 2. Maxillae slightly wider in front than behind, as long as wide. Sternum convex, shield-shaped, strongly rebordered, pointed posteriorly but with anterior margin nearly straight. First coxae wide apart, fourth coxae almost contiguous.

Colour in life: Carapace light brownish yellow with a brown median stripe and a brown marginal band. Chelicerae and sternum deep brown. Maxillae and labium paler than sternum, with yellow tips. Palpi and legs of the same colour as carapace, annulated with deep brown. Abdomen dull yellow with sepia marking which shows great variability. Belly dull yellow with a median blackish brown band.

Distribution: Germany, France, Hungary, England, U. S. S. R., Japan (Southern Saghalien).

53. *Araneus omoeda* THORELL

Pl. XIII, Fig. 24. Dorsal view of female.

Araneus omoeda, S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 333.

Aranea omoeda, R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 114, Taf. 24, Fig. 1281, p. 111, Taf. 23, Fig. 1255.

Epeira omoeda, E. SIMON:—Arachn. de France, Paris, Tom. 1, 1874, p. 66.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 129.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 27, Taf. 1, Fig. 9.

Epeira bicornis, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 19.

Locality: Mt. Daisetsu (1 female, S. NISHIO, August 1–5, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.80	0.60	1.20	1.20	0.80	1.10

Female: Carapace 0.37 cm. long, 0.24 cm. wide between second and third coxae, with definite cervical and median furrows. Eyes typical, in two rows. Posterior eyes somewhat larger than anterior ones. Viewed from above, both rows recurved. Anterior median eyes separated from each other by about two times their diameter, from anterior lateral eyes by four times their diameter. Posterior median eyes separated from each other by two times their diameter. Lateral eyes of both rows contiguous. Quadrangle wider behind than in front in ratio 4 : 3, as long as wide behind. Viewed from in front, the anterior row of eyes straight. Clypeus equal to the diameter of anterior eyes. Chelicerae cone-shaped, vigorous, with convergent outer margins. Labium triangular, more wide at base than long in ratio 3 : 2. Maxillae wider at end than at base in ratio 2 : 1, with parallel inner margins. Sternum shield-shaped, strongly rebordered, with concave anterior margin, pointed behind. First coxae wide apart and fourth coxae subcontiguous. Abdomen with prominent shoulder tubercles.

Colour in alcohol: Carapace deep sepia with a white patch at median furrow. Chelicerae and sternum deeper than carapace. Maxillae and labium dark brown with white tips. Palpi and legs white, but patellae of all legs sepia and annulated with sepia at the end of the other joints. Abdomen paler than carapace and the shoulder tubercles white. Belly brown with a pair of pale stripes from spinnerets to spiracles.

Distribution: Germany, France, Hungary, Japan (Southern Saghalien).

54. *Araneus abscissa* KARSCH

Aranea abscissa, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 225, Taf. 11, Fig. 214.

Epeira abscissa, F. KARSCH:—Verhandl. d. N. V., Jahrg. 36, 1879, p. 69.

Locality: Mt. Akan (1 female, Dr. T. INUKAI, July 11, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.90	0.65	1.30	1.19	0.76	1.20

Female: Carapace 0.30 cm. long, 0.21 cm. wide between second and third coxae. Eyes in two rows, black. Anterior eyes somewhat smaller than posterior eyes. Viewed from above, anterior row recurved, its median eyes separated from each other by two times their diameter and the distance between the median and the lateral eyes equal to four times their diameter. Posterior row of eyes nearly straight, its median eyes separated from each other by their diameter, and the distance between the median and the lateral eyes equal to five times their diameter. Lateral eyes of both rows contiguous. Quadrangle of trapezoidal form, wider in front than behind in ratio 4 : 3, as long as wide. Clypeus equal to the diameter of anterior median eyes. Chelicerae strong, vertical, with well-developed condyles. Labium almost square, more wide than long in ratio 4 : 3, reaching middle of maxillae. Maxillae wider in front than at base in ratio 2 : 1. Sternum shield-shaped, convex, truncated in front, pointed behind between fourth coxae which are separated by 1/2 of their width, first coxae wide apart.

Colour in alcohol: Carapace dull brown with brown pars thoracica. Chelicerae and maxillae are the same in colour as the carapace. Labium black with white tip. Sternum darker than maxillae. Palpi and legs above deep brown, venter yellowish brown. Abdomen dull brown with a brown leaf-marking. Belly blackish brown with a pair of yellow stripes from spinnerets to spiracles.

Distribution: Japan.

55. ***Araneus angulatus*** CLERCK

Pl. XV, Fig. 67. Epigynum from above.

Araneus angulatus, A. PETRUNKEVITCH:—Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 279.

Aranea angulata, J. H. COMSTOCK:— Spider Book, New York, 1913, p. 469, Fig. 483.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 110, 113, Taf. 23, Fig. 1246, Taf. 24, Fig. 1276.

Epeira angulata, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 360, pl. 27, Fig. 259.; T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 3.; ——— :—Südrussischer Spinnen, St. Petersburg, 1875, p. 15.; E. SIMON:—Arachn. de France, Paris, 1874, Tom. 1, p. 52, pl. 1, Fig. 11.; O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 11.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom.

1, 1892, p. 128.; E. KEYSERLING:—Spinnen Amerikas, Epeiridae, Nürnberg, 1892, p. 114, pl. 6, Fig. 84.; J. EMERTON:—Common Spiders, London, 1902, p. 164, Fig. 389. W. BÖSENBERG:—Zoologica, Bd. 14, 1903, Stuttgart, p. 25, Taf. 1, Fig. 5.

Locality: Vicinity of Sapporo (2 females, S. SAITO, Sept. 21, 1929, August 31, 1931). Nopporo (5 females, S. SAITO, August 11, 1933). Bankenuma (1 female, G. HAYASHI, Sept. 19, 1933). Ishikiriyama (1 female, M. SAKAMOTO, Oct. 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Sapporo)	2.10	1.40	3.00	2.80	1.80	2.60
female (Sapporo)	1.75	1.35	2.65	2.50	1.70	2.55
female (Nopporo)	1.70	1.30	3.00	2.80	1.90	2.70
female (Nopporo)	1.70	1.40	2.90	2.70	1.80	2.50
female (Nopporo)	1.70	1.20	2.60	2.50	1.80	2.40
female (Nopporo)	1.60	1.20	2.80	2.60	1.70	2.40
female (Nopporo)	1.60	1.20	2.60	2.30	1.60	2.20
female (Bankenuma)	1.80	1.20	2.90	2.70	1.90	2.80
female (Ishikiriyama)	1.90	1.70	2.80	2.70	1.90	2.70

Female: Carapace 0.74 cm. long, 0.60 cm. wide between second and third coxae, with a definite median furrow. Viewed from above, both rows of eyes recurved. A straight line tangent to anterior edges of posterior median eyes is also tangent to anterior edges of anterior lateral eyes. Median eyes in both rows somewhat larger than the laterals. Anterior median eyes separated from each other by 1.5 times their diameter, from anterior lateral eyes by about six times their diameter. Posterior median eyes separated from each other by 1/3 of their diameter. Lateral eyes of both rows contiguous. Quadrangle wider in front than behind in ratio 5 : 3. Clypeus equal to the diameter of anterior median eyes. Chelicerae strong, cone-shaped, with weakly developed condyles. Labium oval, more wide than long in ratio 5 : 3. Maxillae wider in front than at base in ratio 2 : 1. Sternum oval, more long than wide in ratio 6 : 5, bluntly pointed between fourth coxae which are subcontiguous.

Colour in life: Carapace dull yellow with a black longitudinal median stripe and dark colour along cervical and radial furrows. Chelicerae light brown with black fangs. Maxillae and labium black with white anterior margins. Sternum black with white keel-marking. Palpi and legs yellow, annulated with bright brown at the ends of every joint. Abdomen dull yellow with a dull brown leaf-marking. Sides dull brown. Belly dull yellow with a median black band from spinnerets to spiracles.

Distribution: U.S.A., U.S.S.R., Germany, France, Hungary, England.

56. *Araneus adiantus* WALCKENAER

Araneus adiantus, W. RABELER:—Zeitschr. f. Morph. u. Oekol., Bd. 21, 1931, p. 198.; S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 337.

Aranea adianta, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 23.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 112, 115, Taf. 23, Fig. 1265, Taf. 24, Fig. 1291.

Araneus adianta, S. SAITO:—Annot. Zool. Jap., Vol. 13, 1932, p. 381, Fig. 3.

Epeira adianta, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 348, pl. 25, Fig. 251.; E. SIMON:—Arachn. de France, Paris, Tom. 1, 1874, p. 111.; T. THORELL:—Südrussischer Spinnen, St. Petersburg, 1875, p. 18.; C. P. CAMBRIDGE:—Ann. Mag. Nat. Hist., Vol. 1, 1878, p. 120.; L. KOCH:—Arachn. Sibirien Novaja Semlja, Stockholm, 1879, p. 7.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 133.

Locality: Kamifurano (5 females, S. SAITO, August 30, 1931). Vicinity of Sapporo (2 females, S. SAITO, August 10, 1930). Shiranuka (1 immature male, M. L. PEELLE, July 31, 1931). Mt. Yubari (2 immature males and 2 females, S. MOTODA, July 31, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Kamifurano)	0.80	0.60	1.30	1.20	0.70	1.10
female (Kamifurano)	0.70	0.50	1.30	1.10	0.65	1.10
female (Kamifurano)	0.75	0.55	1.20	1.10	0.60	1.00
female (Kamifurano)	0.80	0.60	1.20	1.00	0.60	1.00
female (Kamifurano)	0.70	0.50	1.20	1100	0.60	0.90
female (Sapporo)	0.80	0.50	1.40	1.20	0.70	1.15
female (Sapporo)	0.80	0.60	1.50	1.20	0.80	1.35

Female: Cephalothorax light yellow with a black, longitudinal median stripe, extending from the posterior extremity to the middle of the pars cephalica; two green lines on the sides of the pars thoracica along the margin. Median and cervical grooves obsolete. Eyes dark grey in colour, moderate in size for the genus, occupying almost the whole part of the width of the caput, lateral eyes in contact antero-posteriorly with each other, four central eyes making a square, a side of which is twice as long as the diameter of the anterior median eyes. Eyes on the whole placed in two nearly parallel recurved transverse lines; the anterior eyes smaller than the correspondin, eyes in the posterioı row; posterior median eyes the largest. Sternum black, oval, pointed behind and truncated in front. Labium oblong-oval, the transverse axis being twice as long as the longitudinal; the termination light yellow and the root black. Abdomen of somewhat oblong form, truncated before and

pointed behind; upper side yellow with eight central longitudinal markings; seven pairs of black flecks inserted from side between the above white markings; under side dull yellow with a strong longitudinal median black band and a pair of white side stripes.

Distribution: Germany, France, England, U.S.S.R., Siberia (Krasnojarsk), Japan (Southern Saghalien).

57. ***Araneus ventricosus*** L. Koch Jap. name, *Onigumo*.

Pl. XV, Fig. 68, a. Sideview of epigynum. b. Epigynum from above.

Araneus ventricosus, S. Saito:—Annot. Zool. Jap., Vol. 13. 1931, p. 143.; ———:—Ibid., Vol. 13, 1932, p. 378.; Th. Sato, Tk. Sato and I. Kayashima:—Sylvia (in Japanese), Vol. 3, 1932, p. 5.; I. Kayashima:—Ibid., Vol. 3, 1932, p. 4.; T. Kambe:—Jour. Chosen Nat. Hist., No. 15, 1933, p. 44 (in Japanese).; S. Saito:—Transact. Sapporo Nat. His., Vol. 13, 1933, p. 54.

Aranea ventricosa, W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1905, p. 213, Taf. 1, Fig. 177, 198, Taf. 3, Fig. 15. Textfig. 3.

Epeira ventricosa, L. Koch:—Verhandl. d. zool. bot. Ges., 1877, p. 739, Taf. 15, Fig. 2.

Epeira sinta, F. Karsch:—Verhandl. d. n. V., Bd. 36, 1879, p. 70, Taf. 1, Fig. 5.

Locality: Sapporo (3 males, 17 females, S. Saito, June 29, Sept. 20, 21, 1929, July 20, 1930). Muroran (1 immature male, Dr. T. Inukai, June 27, 1931). Akkeshi (1 female, S. Motoda, July 24, 1931). Lake Akan (1 female, S. Motoda, July 31, 1931). Mt. Yubari (1 female, S. Motoda, July 9, 1932). Mt. Akan (1 male, 2 females, Dr. T. Inukai, July 11–12, 1932). Kussharo (2 females, S. Nishio, July 15–18, 1932). Nopporo (2 females, S. Saito, August 17, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Sapporo)	1.20	0.80	1.80	1.70	1.10	1.60
male (Sapporo)	1.60	1.00	2.25	2.15	1.40	2.05
male (Sapporo)	1.05	0.80	2.00	2.00	1.20	1.90
male (Mt. Akan)	1.40	0.85	2.70	2.35	1.60	2.35
female (Mt. Akan)	1.80	1.20	2.10	2.00	1.50	2.10
female (Mt. Akan)	1.27	0.87	1.97	1.85	0.87	1.86
female (Sapporo)	1.30	0.90	1.80	1.70	1.00	1.60
female (Sapporo)	1.10	0.70	1.40	1.60	1.00	1.50
female (Mt. Yubari)	1.50	1.10	2.30	2.20	1.40	2.10
female (Kussharo)	1.70	1.10	2.30	2.10	1.60	2.10
female (Akkeshi)	1.65	1.16	2.64	2.64	1.72	2.12
female (Lake Akan)	1.50	1.04	2.08	2.03	1.29	2.10
female (Nopporo)	1.80	1.30	2.70	2.50	1.70	2.30

Female: Carapace 1.00 cm. long, 0.63 cm. wide between second and third coxae, with a definite median furrow. Abdomen oval with a pair of low shoulder tubercles, covered with fine hairs. Legs and palpi vigorous, densely clothed with black hairs and long bristles. Eyes eight, in two rows. Both rows recurved. Median eyes of both rows black, larger than the lateral eyes which are pearly brownish black in colour.

Colour in life: Carapace brownish black, darker toward caput. Clypeus black. Chelicerae black with a large brownish yellow puncture. Sternum blackish brown. Abdomen of the same colour as the thorax, variegated indistinctly with dark margin. Belly lighter than the above with black colour at the circumference of spinnerets and spiracles.

Male: The femora of the two foremost pairs stout and the terminal end of the metatarsus of the second leg furnished with a large projection.

Distribution: Manchuria, Japan (Formosa, Korea, Kyushu, Honshu, Southern Saghalien).

Family X. *TETRAGNATHIDAE*

A comparison with A. PETRUNKEVITCH's table (Trans. Connecticut Acad., Vol. 29, 1928) will show that only his one Subfamily Tetragnathinae corresponds to this family. The genus *Leucauge* was placed by PETRUNKEVITCH among the Tetragnatinae, but I have placed it among the Argiopidae because the *Leucauge* does not have the large characteristic chelicerae of the former and in the other respects resembles the Argiopidae.

Contains a single genus *Tetragnatha*.

1. Genus ***Tetragnatha*** LATREILLE, 1804

58. ***Tetragnatha squamata*** KARSCH

Pl. XV, Fig. 69, a, b. Chelicerae of male. c. Palpus of male. d. Eyegroup.

Tetragnatha squamata, F. KARSCH:—Verhandl. d. n. V., Jahrg. 36, 1879, p. 65, Taf. 1, Fig. 3.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 176, Taf. 3, Fig. 5, Taf. 15, Fig. 405.; S. SAITO:—Transact Sapporo Nat. Hist., Vol. 13, 1934, p. 338, Fig. 9.

Locality: Onuma (2 females, S. SAITO, July 27, 1932). Kussharo (1 male, 3 females, S. NISHIO, July 15–18, 1932). Mt. Kurotake (1 female, Dr. T. UCHIDA, August 1, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Onuma)	0.60	0.40	1.35	1.20	0.65	0.90
female (Onuma)	0.50	0.39	1.20	1.00	0.50	0.70
female (Kurotake)	0.50	0.40	1.20	0.80	0.40	0.80
female (Kussharo)	0.60	0.40	1.20	1.00	0.55	0.80
female (Kussharo)	0.70	0.50	2.00	1.60	0.80	1.20
female (Kussharo)	0.80	0.65	1.50	1.20	0.75	1.00
male (Kussharo)	0.75	0.50	1.70	1.40	0.80	1.10

Female: Carapace 0.25 cm. long, 0.15 cm. wide between second and third coxae. Both rows of eyes recurved, parallel. Posterior row slightly shorter than the first row. All eyes equal in size. Anterior median eyes separated from each other by three times their radius, from anterior lateral eyes by four times the radius. Posterior eyes almost equidistant, separated by three times the radius. Quadrangle almost square in shape. Clypeus equal to four times the diameter of eye. Chelicerae powerful, not widely divergent, 0.12 cm. long. Labium more wide than long in ratio 3 : 2, rounded and strongly rebordered. It does not reach the middle of maxillae. Maxillae with parallel truncatures and divergent outer margins. Sternum more long than wide in ratio 5 : 4, exeavated slightly in front to accommodate the labium, produced into sharp points between all coxae and sharply pointed behind. Space between second coxae widest. Legs slender, long, furnished with short black hairs and long black bristles.

Colour in alcohol: Carapace yellow with green cervical and median furrows. Chelicerae and maxillae paler than carapace. Labium and sternum deep yellow. Coxae, femora of legs and palpi greenish yellow, the other joints of legs deep yellow. Abdomen yellow with black mésh forming a median band extending full length of abdomen. Sides of abdomen and belly yellowish green with silver fleck. Spinnerets dark yellow.

Distribution: Japan (Kyushu, Southern Saghalien).

59. ***Tetragnatha yesoensis*** n. sp. Jap. name, *Yezo-ashinagagumo*.

Pl. XIII, Fig. 25, a, b. Dorsal view of male.

Pl. XV, Fig. 70, a. Palpus of male. b, c. Chelicerae of male.

Locality: Lake Akan (3 males, S. MOTODA, July 31, 1931). Mt. Daisetsu (1 male, Dr. T. INUKAI, July 3-4, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Lake Akan)	0.83	0.58	2.61	1.89	0.90	1.52
male (Lake Akan)	0.67	0.41	2.04	1.49	0.80	1.34
male (Lake Akan)	0.67	0.47	2.09	1.73	0.72	1.39
male (Mt. Daisetsu)	0.80	0.50	2.10	1.50	0.80	1.30

Male: Carapace without chelicerae 0.26 cm. long, 0.17 cm. wide between second and third coxae. Viewed from above, posterior row of eyes slightly shorter than anterior row and more recurved. Four median eyes largest and anterior lateral eyes smallest, eye-ratio 5 : 4 : 3. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by 12/5 of their diameter. Posterior median eyes separated from each other by their diameter, from posterior lateral eyes by 8/5 of their diameter. The distance between the laterals is greater than that between the medians in ratio 6 : 5. Quadrangle square in shape. Clypeus equal to the length of quadrangle of median eyes. Chelicerae strongly divergent, 0.27 cm. long. Lower margin of chelicerae with six teeth, upper margin with three teeth. The first and second teeth of lower margin very strong, and the first tooth of upper margin strong and divaricated into two blunt ends. Labium more wide than long in ratio 5 : 3, rounded and strongly rebordered. It does not quite reach the middle of maxillae. Maxillae with parallel truncatures and divergent outer margins. Sternum as wide as long, excavated in front to accommodate the labium, produced into sharp points between all coxae and sharply pointed behind. First coxae wide apart, fourth coxae separated by a little more than one quarter of their width.

Colour in alcohol: Carapace yellow with a brown median marking extending from median eyes to median furrow. Chelicerae, legs and palpi yellow. Maxillae, labium and sternum brownish yellow. Abdomen brownish yellow. The specimen from Mt. Daisetsu has abdomen yellow with a leaf-marking of white spots. Belly dark yellow with white spots.

Remarks: The species bears a general resemblance to *Tetragnatha extensa* (LINNAEUS) in appearance, but the armature of chelicerae makes it a distinct species.

60. ***Tetragnatha praedonia*** L. KOCH Jap. name, *Ashinagagumo.*

Tetragnatha praedonia, L. KOCH:—Verhandl. d. k. k. zool. bot. Ges., Bd. 27, 1877, p. 744, Taf. 15, Fig. 6–9.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 177, Taf. 3, Fig. 7, Taf. 15, Fig. 404.; S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1933, p. 47, pl. 3, Fig. 22.

Locality: *Sapporo* (3 *females*, S. SAITO, Sept. 21. 1929, Sept. 10, 1930). Yakumo (5 females, S. SAITO, July 24, 1930, July 26, 1931). Mt. Daisetsu (1 male, Dr. T. INUKAI, August 14, 1930). Onuma (5 males, S. SAITO, July 25, 1931). Mt. Akan (3 females, Dr. T. INUKAI, July, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Mt. Daisetsu)	0.60	0.39	1.70	1.12	0.63	1.09
male (Onuma)	0.75	0.50	1.70	1.10	0.55	1.10
male (Onuma)	0.70	0.40	1.50	1.10	0.50	1.00
male (Onuma)	0.50	0.40	1.30	0.90	0.40	0.80
male (Onuma)	0.70	0.50	1.60	0.80	0.50	1.00
male (Onuma)	0.70	0.50	1.80	1.20	0.62	1.10
female (Sapporo)	0.98	0.72	2.35	1.20	0.72	1.32
female (Sapporo)	0.90	0.70	2.30	1.50	0.80	1.50
female (Sapporo)	1.00	0.70	2.20	1.50	0.80	1.50
female (Yakumo)	1.20	0.80	2.30	1.50	0.70	1.50
female (Yakumo)	1.00	0.90	2.20	1.50	0.70	1.40
female (Yakumo)	1.10	0.80	2.70	1.80	0.90	1.65
female (Yakumo)	0.90	0.80	1.70	1.20	0.70	1.00
female (Yakumo)	0.90	0.70	2.20	1.50	0.60	1.30
female (Mt. Akan)	1.25	0.98	2.85	1.80	0.85	1.70
female (Mt. Akan)	1.04	0.70	2.57	1.72	0.79	1.32
female (Mt. Akan)	1.08	0.89	2.20	1.50	0.84	1.60

Female: Carapace 0.46 cm. long, 0.26 cm wide between second and third coxae. Anterior row of eyes recurved, posterior row slightly recurved and almost as long as the anterior. Anterior eyes smaller than the posterior eyes. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by three times their diameter. Posterior median eyes separated from each other by their radius, from posterior lateral eyes by their diameter. Laterals of both rows separated by the radius of the anterior lateral eyes. Quadrangle wider behind than in front in ratio 12 : 9, as long as wide. Clypeus equal to the front width of the quadrangle of median eyes. Chelicerae powerful, strongly diverging. Basal joint 0.28 cm. long. Upper margin of claw-furrow with ten teeth. Considerable space between the second and third teeth. Lower margin also with ten teeth. The second tooth very large. Labium trapezoid in shape, more wide than long in ratio 7 : 4. It does not quite reach the middle of maxillae. Maxillae with divergent outer edges. Sternum as wide as long, excavated in front to accommodate the labium, produced into sharp

points between all coxae and sharply pointed behind. Second coxae widest apart, fourth coxae separated by a little more than one quarter of their width.

Colour *in life*: Carapace, legs, chelicerae and palpi yellow. Maxillae brown. Labium black. Sternum blackish brown. Abdomen yellow with a leaf-marking. Belly brown from genital fold to spinnerets, bordered on each side by a yellow band.

Distribution: Japan (Formosa, Kyushu, Honshu).

61. *Tetragnatha extensa* (LINNAEUS)

Tetragnatha extensa, H. ZIMMERMANN:—Die Spinnen der umgegend von Niesky, p. 82.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 118, Taf. 25, Fig. 1332.; T. THORELL:—Oefvers. af K. Vet.-Akad. Förh., Bd. 17, 1858, p. 147.; J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 337, pl. 28, Fig. 265.; ——— :—Ann. Mag. Nat. Hist., Vol. 5, 1870, p. 404.; T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 40.; E. SIMON:—Arachn. de France, Paris, Tom. 1, 1874, p. 115.; T. THORELL:—Südrussischer Spinnen, St. Petersburg, 1875, p. 20.; O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 46.; L. KOCK:—Arachn. Sibirien Novaja Semlja, Stockholm, 1879, p. 7.; H. LUDWIG:—Tierkunde, Bd. 2, 1886, p. 588.; G. MARX:—Proc. Nat. Mus., 1889, Vol. 12, p. 552.; J. H. EMERTON:—Common Spider, London, 1902, p. 201, Fig. 462, 466.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 59, Taf. 4, 5, Fig. 55.; N. BANKS:—Proc. Nat. Mus., Vol. 25, 1903, p. 215.; ——— :—Bull. U. S. Nat. Mus., Vol. 72, 1910, p. 37.; A. PETRUNKEVITCH:—Bull. Amer. Mus. Nat. Hist., Vol. 29, 1911, p. 390.; J. H. COMSTOCK:—Spider Book, N. Y., 1913, p. 411.; V. KULCZYNSKI:—Aran. Oribatidae Exped. Sibiriam Arcticam Occidentalem, Petrograd, 1916, p. 21.; C. R. CROSBY and S. C. BISHOP:—Memoir Cornell Univ. Agr. Exper. Station, 1926, p. 2057.; M. L. PEELLE and S. SAITO:—Jour. Faculty Sc. Hokkaido Imper. Univ., 6 ser., Vol. 2, 1932, p. 95, Fig. 8.; S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 339.

Aranea extensa, J. FABRICIUS:—Ent. Syst., Tom. 2, 1793, p. 407.

Locality: Vicinity of Sapporo (1 male, S. SAITO, August 10, 1930). Mt. Yubari (1 male, S. MOTODA, July 19, 1932). Kussharo (1 male, 1 female, S. NISHIO, July 15–18, 1932). Mt. Daisetsu (1 female, S. NISHIO, August 1–5, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Sapporo)	0.78	0.61	3.10	1.75	0.78	1.57
male (Mt. Yubari)	0.95	0.50	2.40	1.50	0.70	1.60
male (Kussharo)	1.20	0.70	2.70	1.80	1.00	1.80
female (Kussharo)	1.10	0.90	2.70	2.00	1.00	1.80
female (Mt. Daisetsu)	0.80	0.50	1.90	1.10	0.60	1.10

Male: *Carapace without chelicerae 0.40 cm. long, 0.25 cm. wide between* second and third coxae. Viewed from above, anterior row of eyes more recurved than posterior row, both rows equal in length. Anterior eyes larger than corresponding eyes of posterior row. Posterior median eyes separated from each other by their long diameter, and from posterior lateral eyes by the same distance. Anterior median eyes separated from each other by three times their radius. Laterals of both rows contiguous. Quadrangle wider behind than in front in ratio 10 : 7, as wide as long. Clypeus equal to the diameter of anterior median eyes. Labium triangular, rounded at end, rebordered. Sternum longer than wide, pointed behind, produced between all coxae with ends merging with the edge of the carapace and leaving circular holes for the coxae.

Colour in alcohol: Carapace and appendages deep yellow. Abdomen above and on sides covered with small silvery dots. A median buff band on the back.

Distribution: France, Germany, Hungary, Sweden, England, U.S.S.R., Siberia, U. S. A., Canada, Alaska, Japan (Southern Saghalien).

62. ***Tetragnatha exquista*** Saito Jap. name, *Hime-ashinagagumo.*

Pl. XIII, Fig. 26. Dorsal view of male.

Pl. XV, *Fig. 71. Palpus of male.*

Tetragnatha exquista, S. Saito:—Proc. Imper. Academy, Vol. 9, 1933, p. 275.

Locality: Mt. Akan (2 males, Dr. T. Inukai, July 11–12, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	0.55	0.30	1.60	1.14	0.60	0.85
male	0.55	0.32	1.85	1.45	0.69	1.10

Male: Carapace 0.19 cm. long. Viewed from above, both rows of eyes slightly recurved. Anterior eyes somewhat smaller than the posterior. Separation between anterior median eyes slightly narrower than their diameter, the lateral eyes separated by almost two times their diameter. Posterior eyes equidistant, their separation equal to their diameter. Lateral eyes of both rows separated by the diameter of anterior eyes. Quadrangle wider behind than in front in ratio 9 : 7. Clypeus a little smaller than the length of quadrangle of median eyes. Chelicerae long, the claw-furrow armed on the anterior margin with fiive teeth, the first tooth somewhat stronger than the others, separated from the second by a very long toothless space, posterior margin also provided with five teeth. Labium triangular,

slightly rounded at the apex, more long than wide at base in ratio 1 : 2.5. Maxillae nearly square, more long than wide in ratio 3 : 1. Sternum triangular, broadly truncated in front.

Colour in alcohol: Carapace dull yellow. Chelicerae, palpi and legs bright yellow. Maxillae and labium dull yellow, darker than carapace. Abdomen silvery, sides yellowish silver. Belly silver with black meshing.

Distribution: Japan (Rebun; An island in the neighbourhood of Hokkaido).

63. ***Tetragnatha pinicola*** L. Koch

Tetragnatha pinicola, L. Koch:—Arachn. Sibirien Novaja Semlja, Stockholm, 1879, p. 7.; C. Chyzer et L. Kulczynski:—Araneae Hungariae, Budapest, Tom. 1, 1891, p. 144, Tab. 6, Fig. 8.; O. P. Cambridge:—Ann. Mag. Nat. Hist., 6 ser., Vol. 15, 1895, p. 37.; W. Bösenberg:—Zoologica, Stuttgart, 1903, Bd, 14, p. 61, Taf. 4, 5, Fig. 58.; R. Bremen:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 118, Taf. 25, Fig. 1331, Taf. 24, Fig. 1334.

Locality: Shiranuka (1 male, 4 females, M. L. Peelle, July 31, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	1.00	0.60	1.80	1.20	0.60	1.10
female	1.00	0.60	2.00	1.40	0.70	1.20
female	0.70	0.45	1.50	1.00	0.50	0.90
female	0.85	0.60	1.70	1.20	0.60	1.00
male	0.70	0.50	1.90	1.20	0.70	1.20

Female: Carapace with chelicerae 0.32 cm. long, 0.21 cm. wide in the region of the cervical groove. Anterior eyes smaller than the corresponding eyes in the posterior row. Anterior eyes equal in size. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by three times their diameter. Posterior eyes equidistant and equal in size, separated from each other by their diameter. Quadrangle wider behind than in front in ratio 4 : 3, somewhat more long than wide. Clypeus equal to the radius of anterior median eyes. Chelicerae strongly divergent, basal segment 0.20 cm. long. Fang long, slender, bent not far from base, then straight. There is a slight swelling on the ventral side of the fang at the beginning of the straight portion. Labium as long as wide, rounded anteriorly. Maxillae much more long than wide in ratio 3 : 1. Sternum more long than wide, triangular, pointed behind, space between the first coxae widest, with lateral projections between the coxae, extending to the edge of the carapace and leaving circular openings for the coxae. Abdomen

cylindrical, 0.18 cm. wide in middle.

Colour in alcohol: Carapace, chelicerae, legs and maxillae dark yellow. Labium black with white end. Sternum dull yellow, slightly dusky at fringe. Abdomen spotted with silvery dots and a median longitudinal mesh-band. Belly dull yellow with a median black band bordered by a white stripe. Spinnerets dark yellow.

Distribution: Siberia, Germany, Hungary.

Family XI. *AMAUROBIIDAE*

One genus is represented in the fauna of Hokkaido.

1. Genus ***Amaurobius*** C. L. KOCH, 1837

64. ***Amaurobius claustrarius*** (HAHN)

Pl. XV, Fig. 72, a, b. Palpus of male.

Amaurobius claustrarius, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 503.; E. SIMON:—Arachn. de France, Paris, Tom. 1, 1874, p. 223.; T. THORELL:—Südrussischer Spinnen, St. Petersburg, 1875, p. 35.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, 1892, p. 164.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 251, Taf. 23, Fig. 363.; R. BREMEN:—*Tierwelt Mitteleuropas, Leipzig,* Bd. 3, Lief. 2, p. 119, Taf. 25, Fig. 1338, Taf. 24, Fig. 1348.

Locality: Soranuma (1 male, 1 female, S. MAKINO, Sept. 8, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	0.92	0.46	1.58	1.46	1.20	1.45
female	1.30	0.82	1.52	1.34	1.25	1.30

Female: Carapace 0.52 cm. long, 0.44 cm. wide between second and third coxae with a definite longitudinal median furrow and three pairs of radial furrows. Eight eyes in two rows, both rows almost parallel, slightly recurved. Anterior eyes somewhat smaller than posterior ones. Anterior median eyes diurnal, separated from each other by their diameter, from anterior lateral eyes by 2.5 times their diameter. Posterior median eyes separated from each other by twice their diameter, from posterior lateral eyes by the same distance as that between two posterior median eyes. Quadrangle wider behind than in front in ratio 14 : 9, somewhat more long than wide behind. Lateral eyes of both rows separated by three times the radius of anterior eyes. Clypeus equal to twice the diameter of anterior median eyes. Chelicerae strong, diverging, with vigorous fangs, measuring 0.29 cm. long without fang. Labium rectangular, as long as

wide, reaching beyond middle of maxillae. Maxillae inclined over labium, wider at end than at base in ratio 3 : 1. Sternum heart-shaped, strongly rebordered, concave anteriorly, pointed between fourth coxae which are subcontiguous.

Colour in alcohol: Carapace dull brown with dark brown caput, median and radial furrows. Chelicerae dark brown. Maxillae and labium deep brown with paler tips. Sternum bright brown with deep fringe. Legs and palpi dull brown, annulated with dark brown at the ends and at the bases of all joints. Abdomen black with six pairs of white markings arranged longitudinally.

Male: Carapace 0.43 cm. long, 0.37 cm. wide between second and third coxae. Abdomen relatively small. Legs slender. Colour paler than that of female, dark brown colour of caput and annulations of legs and palpi wanting. The first pair of white marking of abdomen larger than the others.

Distribution: France, Germany, Hungary, U. S. S. R.

Family XII. *AGELENIDAE*

This family presents intermediate forms not only within its own limits, but also with such other families as the Lycosidae and the Theridiidae. Especially it is difficult to separate clearly certain species among the Lycosidae from some of the Agelenidae. The genera of the Agelenidae represented in Hokkaido can be distinguished by using the following table.

1. a. Hind spinnerets with the apical segment at least as long as the basal segment. .... 2.
   b. Hind spinnerets with the apical segment much shorter than the basal segment. .... 4.
2. a. Both rows of eyes very strongly procurved, so that the anterior median eyes and the posterior lateral eyes form nearly a straight line. .... 2. Gen. *Agelena* WALCKENAER
   b. Neither rows of eyes procurved. .... 3.
3. a. Anterior median eyes much larger than the anterior lateral eyes .... 1. Gen. *Coras* SIMON
   b. Anterior median eyes not larger than the anterior lateral eyes.......... 3. Gen. *Tegenaria* LATREILLE
4. a. Anterior median eyes as large as the lateral eyes. .... 4. Gen. *Cicurina* MENGE
   b. Anterior median eyes much smaller than the laterals. .... 5. Gen. *Cryphoeca* THORELL

1. Genus *Coras* Simon, 1898

65. *Coras luctuosus* (L. Koch)

Pl. XIII, Fig. 27. Dorsal view of female.

Pl. XV, Fig. 73. Epigynum.

Coras luctuosus, L. Koch:—Verhandl. d. k. k. zool. bot. Ges., Bd. 27, 1877, p. 753, Taf. 15 Fig. 14, 15.; W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1905, p. 300, Taf. 16, Fig. 459.

Locality: Mt. Tokachi (1 female, S. Saito, August 28, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.80	0.50	1.35	1.20	1.20	1.50

Female: Carapace 0.43 cm. long, 0.32 cm. wide between second and third coxae. A shallow depression of an indefinite shape in place of a median furrow. Posterior eyes oval, equal in size, equidistant, arranged in a slightly recurved row, separated by twice their short diameter. Anterior row of eyes straight, the median eyes larger than the lateral ones, their interval equal to three times their radius. Quadrangle rectangular, more long than wide at base in ratio 3 : 2, reaching a little beyond middle of maxillae. Maxillae much wider in front than at base in ratio 2 : 1, with parallel outer edges. Sternum heart-shaped, with straight anterior margin, as wide as long, pointed between the almost contiguous fourth coxae.

Colour in alcohol: Carapace white with dull yellow caput and a brown median longitudinal line and black stripes along radial grooves. Chelicerae dull yellow with brown claws. Maxillae, palpi and legs light yellow. Labium dark. Sternum dull yellow with brown fringe. Abdomen deep sepia with yellow heart-marking, three converse V-shaped markings and irregular dots. Belly dull yellow with scattered black spots.

Distribution: Japan.

2. Genus *Agelena* Walckenaer, 1805

66. *Agelena limbata* Thorell

Agelena limbata, W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1905, p. 296, Taf. 8, Fig. 104, Taf. 16, Fig. 461.

Locality: Mt. Akan (4 females, Dr. T. Inukai, August, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	1.70	1.20	2.10	1.70	2.00	2.50
female	1.60	1.10	2.10	2.00	1.90	2.30
female	1.40	1.00	2.00	1.80	1.80	2.30
female	1.70	1.20	2.00	1.80	1.80	2.30

Female: Carapace 0.60 cm. long, 0.45 cm. wide between second and third coxae. Posterior median eyes nocturnal. Viewed from above, anterior row of eyes nearly straight along lower margins, posterior row procurved strongly. Anterior eyes equidistant, separated from each other by 1/8 of the diameter of anterior median eyes. Posterior eyes also equidistant, separated from each other by 1.5 times the diameter of the posterior median eyes. Lateral eyes of both rows separated by the same distance as that between anterior eyes. Quadrangle rectangular, more long than wide in ratio 7 : 5. Clypeus equal to two times the diameter of anterior median eyes. Chelicerae vertical, moderately long, with well-developed condyles, their basal joints 0.32 cm. long. Labium trapezoidal, more wide than long in ratio 6 : 5, reaching middle of maxillae. Maxillae wider in front than at base, with parallel outer edges. Sternum heart-shaped, as long as wide, strongly rebordered, truncated anteriorly, pointed posteriorly between fourth coxae which are separated by 1/2 of their width. Posterior spinnerets 0.28 cm. long.

Colour in alcohol: Carapace light brown with dark caput and brown submarginal band. Chelicerae brownisch black. Sternum and labium dark brown. Maxillae, palpi and legs light brown. Abdomen dark brown with a series of spots of light colour arranged in pairs on both sides of the median deep brown band. Belly light brown. Spinnerets deep yellowish brown.

Distribution: Japan (Honshu, Kyushu).

67. *Agelena japonica* Karsch

Pl. XV, Fig. 74. a. Eyegroup. b. Epigynum.

Agelena japonica, F. Karsch:—Verhandl. d. N. V., Jahrg. 36, 1879, p. 98, Taf. 1, Fig. 17.; W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1905, p. 297, Textfig. 6.; S. Saito:—Proc. Imper. Academy, Vol. 9, 1933, p. 273.

Locality: Vicinity of Sapporo (1 female, S. Saito, July 6, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	1.20	0.80	2.00	1.80	1.75	2.30

Female: Carapace 0.45 cm. long, 0.34 cm. wide between second and third coxae, considerably narrowed toward the front where it is 0.23 cm. wide in the eye region. Viewed from above, both rows strongly recurved. All eyes nearly equal in size, but posterior median eyes oval in shape. Anterior eyes equidistant, separated by their diameter. Posterior median eyes separated by twice their short diameter, from posterior lateral eyes by three times their short diameter. Lateral eyes of both rows contiguous. Quadrangle rectangular, more long than wide in ratio 12 : 11. Clypeus equal to the length of quadrangle of median eyes. Chelicerae parallel, strong, 0.32 cm. long without fang. Labium triangular, bluntly ending anteriorly, more long than wide at base in ratio 3 : 2. Maxillae much wider in front than at base in ratio 3 : 2. Sternum oval, convex, narrowed anteriorly to the width of labium, pointed behind. Second coxae most widely apart, fourth coxae subcontiguous.

Colour in life: Carapace dark brown with pale caput. Chelicerae deep brown. Sternum paler than chelicerae. Maxillae, labium, palpi and legs greenish yellow. Abdomen greenish black. Belly dark brownish black. Spinnerets brown.

Distribution: Japan (Honshu ?)[1]

68. *Agelena opulenta* L. Koch

Pl. XV, Fig. 75. Epigynum.

Agelena opulenta, L. Koch:—Verhandl. d. k. k. zool. bot. Ges., Bd. 27, 1877, p. 757, Taf. 15, Fig. 23.; W. Bösenberg u. E. Strand:—Japanische Spinnen, Stuttgart, 1905, p. 298, Taf. 16, Fig. 467.

Locality: Sapporo (1 male, 1 female, S. Saito, Sept. 20, 1929). Akkeshi (1 male, 2 immature females, S. Motoda, July 11, 1931). Nopporo (1 immature male, 1 female, S. Saito, August 17, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Akkeshi)	0.87	0.66	0.99	0.96	0.89	1.20
male (Sapporo)	0.86	0.65	1.80	1.60	1.50	2.10
female (Sapporo)	1.04	0.81	1.40	1.30	1.20	1.50
female (Nopporo)	0.65	0.40	0.95	0.90	0.80	1.00

Female: Carapace 0.28 cm. long, 0.25 cm. wide between second and third coxae. Viewed from above, anterior row of eyes slightly procurved, posterior row moderately procurved. All eyes equal in size and equidistant,

1) W. Bösenberg and E. Strand collected one adult female from Northern Japan, but F. Karsch did not give the locality.

separated from each other by about their diameter. Quadrangle rectangular, more long than wide in ratio 17 : 14. Viewed from in front, anterior row of eyes strongly upcurved. Clypeus equal to the length of quadrangle of median eyes. Chelicerae relatively long, cone-shaped. Labium rectangular, bluntly ending anteriorly, more wide than long in ratio 6 : 5, reaching a little beyond middle of maxillae. Maxillae wider in front than at base in ratio 2 : 1, with parallel truncatures. Sternum heart-shaped, with straight anterior margin, pointed between fourth coxae which are separated by their width.

Colour in life: Carapace light brown with dark cervical and radial grooves. Chelicerae brownish yellow. Maxillae, labium, palpi and legs light yellow, but legs and palpi annulated with deep yellowish brown at the end of all joints. Sternum deep brown with blackish median patch. Abdomen dark yellow with paired pale spots. Belly white with a median broad dark band from spinnerets to epigynum.

Male: Colour and marking clearer than those of female. Palpi and legs greenish yellow with yellow coxae and trochanters. Abdomen bright brown.

Distribution: Japan (Kyushu, Honshu).

3. Genus *Tegenaria* LATREILLE, 1804

69. *Tegenaria corasides* BÖS. et STRAND

Tegenaria corasides, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 301, Taf. 16, Fig. 460.

Locality: Makomanai (1 immature male, 1 female, S. SAITO, Sept. 23, 1929). Sapporo (3 females, S. SAITO, Oct. 6, 1929, May 19, 1932). Oshoro (1 male, S. SAITO, Sept. 19, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Oshoro)	1.20	0.70	1.90	1.80	1.70	2.10
female (Sapporo)	1.20	0.70	1.50	1.50	1.30	1.70
female (Sapporo)	1.10	0.75	1.20	1.20	1.00	1.30
female (Sapporo)	1.40	0.90	1.60	1.40	1.10	1.60

Male: Carapace 0.70 cm. long, 0.42 cm wide between second and third coxae, 0.28 cm. wide in the eye-region, with a definite longitudinal median furrow. Anterior row of eyes slightly recurved, posterior row slightly procurved. All eyes equal in size and equidistant, separated from each other by their diameter. Quadrangle rectangular, as long as wide.

Lateral eyes of both rows contiguous. Chelicerae short, strong, furnished with four teeth at upper and lower margins of claw-furrow. Labium rectangular, slightly more long than wide. Maxillae wider in front than at base in ratio 3 : 2, with divergent outer margins. Sternum oval, rebordered strongly, rounded anteriorly, pointed behind.

Colour in life: Carapace greenish yellow with dark colour along the median and radial furrows. Caput pale brown. Chelicerae deep brown. Maxillae, labium darker than carapace. Sternum dull yellow. Palpi and legs light brown. Abdomen above and below light green with irregular sepia spots.

Distribution: Japan (Kyushu).

4. Genus ***Cicurina*** MENGE, 1869

70. ***Cicurina cinerea*** PANZER

Pl. XV, Fig. 76. Eyegroup.

Cicurina cinerea, W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 232, Taf. 21, Fig. 329.; E. SIMON:—Arachn. de France, Paris, Tom. 2, 1875, p. 21.

Cinerea cicur, C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 2, 1897, p. 155.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 125, Taf. 25, Fig. 1415, 1416.

Tegenaria cinerea, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 514.

Aranea cinerea, C. FABRICIUS:—Syst. Ent., Tom. 2, 1793, p. 410.

Locality: Yakumo (1 female, S. SAITO, July 24, 1931). Lake Akan (1 male, S. MOTODA, July 31, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Yakumo)	0.42	0.24	0.65	0.62	0.47	0.62
male (Lake Akan)	0.41	0.25	0.63	0.59	0.32	0.60

Female: Carapace 0.13 cm. long, gradually narrowed toward the caput, with a definite longitudinal median groove. Eight eyes in two rows. Anterior row straight, posterior row slightly recurved and much longer than anterior row in ratio 14 : 11. All eyes equal in size. Anterior eyes equidistant, separated by 1.5 times their diameter. Posterior eyes also equidistant, separated by twice their diameter. Quadrangle wider behind than in front in ratio 8 : 7, as long as wide. Lateral eyes of both rows separated by the same distance as the interval between the anterior eyes. Clypeus equal to the diameter of eyes. Chelicerae weak, parallel. Labium triangular, much wider at base than long in ratio 3 : 1. Maxillae inclined over labium, wider in front than long in ratio 2 : 1, with parallel outer

margins. Sternum circular, convex, rounded posteriorly. Fourth coxae separated from each other by twice their width.

Colour in alcohol: Carapace deep reddish brown. Palpi, legs, chelicerae, maxillae and labium light brown. Sternum darker than labium. Abdomen reddish black.

Distribution: Germany, France, Hungary.

71. ***Cicurina maculipes*** n. sp. Jap. name, *Shima-kotanagumo*.

Pl. XIII, Fig. 28. Dorsal view of female.

Pl. XV, 77. Eyegroup.

Locality: Sapporo (1 female, S. SAITO, Sept. 6, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.28	0.16	0.15	0.20	0.20	0.30

Female: Carapace 0.14 cm. long, ·10 cm. wide between second and third coxae with a definite cervical and an indefinite median furrow. Eyes eight, equal in size, in two rows. Viewed from above, anterior row of eyes recurved, posterior row procurved, The eyes equidistant in each row, anterior eyes separated by 3/5 of their diameter and posterior eyes by their diameter. Lateral eyes of both rows separated by their diameter. Quadrangle square in shape, more long than wide in ratio 15 : 13. Clypeus equal to the radius of the eyes. Chelicerae weak, with parallel inner margins. Labium oval, more wide than long in ratio 3 : 2, rounded anteriorly and posteriorly. Maxillae wider in front than at base in ratio 5 : 3, more long than front width. Sternum oval, narrowed anteriorly to the width of labium and pointed posteriorly between fourth coxae which are separated by their width.

Colour in life: Carapace dull yellow with black colour along the cervical and median furrows. Chelicerae, maxillae, labium and sternum darker than carapace. Palpi and legs dull yellow, annulated indistinctly with black. Abdomen dull yellow with a black median longitudinal stripe, giving off seven pairs of branches to sides.

Remarks: The species bears some resemblance in general appearance and size to *Cicurina cinerea* PANZER, but it differs chiefly in colour and in arrangement of eyes.

5. Genus *Cryphoeca* THORELL, 1870

72. ***Cryphoeca angularis*** n. sp. Jap. name, *Sumi-kotanagumo.*

Pl. XIII, Fig. 29. Dorsal view of female.

Pl. XV, Fig. 78, a. Eyegroup. b. Sternum.

Locality: Sapporo (1 female, S. SAITO, Sept. 7, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.50	0.28	0.77	0.60	0.49	0.80

Female: Carapace 0.28 cm. long, 0.18 cm. wide between second and third coxae, with a definite median furrow. Eyes eight, in two rows, anterior row recurved, posterior row procurved. Posterior median eyes nocturnal, most largest, anterior median eyes and posterior lateral eyes slightly smaller than anterior lateral eyes. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by five times their diameter. Posterior median eyes separated from each other by their diameter, from posterior lateral eyes by twice their diameter. Quadrangle wider behind than in front in ratio 5 : 3, more long than wide in ratio 8 : 3. Lateral eyes of both rows contiguous. Clypeus equal to the diameter of anterior median eyes. Chelicerae vertical, weak, with short fangs. Labium trapezoid in shape, as wide as long. Maxillae with rounded outer edges. Sternum oval, rounded anteriorly, pointed behind.

Colour in life: Carapace light yellow with black edge and two rows of black hairs from posterior lateral eyes to posterior margin of carapace. Chelicerae yellow with brown claw. Maxillae, labium, palpi, and legs light yellow. Sternum black with a broad median longitudinal yellow band and three pairs of yellow points which are opposite to the last three coxae. Abdomen light yellow with several black spots at the posterior part. Belly darker than above with a pair of black spots at both sides of epigynum.

Remarks: This species is somewhat similar in general form to *Cryphoeca silvicola* L. KOCH, but the present specimen is distinct in the colour of the abdomen which in the latter is black with a paler corner-fleck, and also in the marking of sternum.

Family XIII. *PISAURIDAE*

It is extremely difficult to draw a line between the Agelenidae and the Pisauridae and between the Pisauridae and the Lycosidae.

The present work describes a single genus *Dolomedes*.

1. Genus **Dolomedes** LATREILLE, 1804

73. ***Dolomedes saganus*** BÖS. et STRAND

Pl. XV, Fig. 79. Eyegroup.

Dolomedes saganus, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 312, Taf. 8, Fig. 115, Taf. 13, Fig. 328.

Locality: Numanohata (1 male, 1 female, Y. OHTA, June, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male	1.12	0.63	1.90	1.90	1.70	2.07
female	1.00	0.64	1.32	1.32	1.10	1.32

Female: Carapace 0.40 cm. long, 0.31 cm. wide between second and third coxae with a longitudinal median furrow and three pairs of radial furrows. Eight eyes in two rows. Both rows recurved. Posterior eyes largest, anterior lateral eyes smallest. Eye ratio 8 : 5 : 3. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by their radius. Posterior median eyes separated from each other by three times their radius, from posterior lateral eyes by about their diameter. Quadrangle wider behind than in front in ratio 3 : 2, more long than wide in ratio 13 : 12. Lateral eyes of both rows separated by 11/8 of the diameter of the posterior eyes. Clypeus equal to the length of the quadrangle of median eyes. Chelicerae weak, parallel, with short fangs. Labium more wide than long in ratio 5 : 2, articulated to maxillae at 1/3 distance from base. Maxillae more long than wide in front in ratio 3 : 2, wider in front than at base in ratio 5 : 3. Sternum shield-shaped, convex, strongly rebordered, narrowed anteriorly to the width of labium, pointed posteriorly, as long as wide.

Colour in alcohol: Carapace light yellowish brown with a broad longitudinal median dark band. Chelicerae deep brown. Maxillae and labium dull yellow. Sternum dull yellow with black fringe. Palpi and legs deeper than carapace. Abdomen yellowish brown with a median broad dark band ranging through the whole length. Belly dull yellow.

Distribution: Japan (Kyushu).

74. ***Dolomedes sulfureus*** L. KOCH Jap. name, *Iôiro-hashirigumo*.

Pl. XV, Fig. 180. Eyegroup.

Dolomedes sulfureus, L. KOCH:—Verhand. d. k. k. zool. bot. Ges., Bd. 27, 1877, p. 778.; W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905. p. 311, Taf. 13, Fig. 330.; K. KISHIDA:—Idiobiologia Aranearum (in Japanese), Tokyo, 1933, p. 56–59, Fig. 52–55.

Locality: Mt. Akan (1 female, Dr. T. INUKAI, August, 1933). Nopporo (1 female, S. SAITO, August 17, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Mt. Akan)	1.20	0.75	1.70	1.70	1.50	1.90
female (Nopporo)	0.90	0.60	1.30	1.30	1.10	1.35

Female: Carapace 0.50 cm. long, 0.44 cm. wide between second and third coxae. Cervical, radial and median furrows wanting. Viewed from above, anterior row of eyes straight, equidistant and equal in size, their separation equal to 1/3 of their diameter. Second row of eyes nearer to anterior row than the third row in ratio 5 : 4, and shorter than anterior row in ratio 11 : 10, the eyes separated from each other by their diameter. Third row of eyes longer than anterior row in ratio 16 : 11. Clypeus equal to the length of eye-region. Chelicerae vertical, strong, the basal joint 0.25 cm. long. Labium oval, more long than wide in ratio 4 : 3. Maxillae almost parallel, with well-developed scopula. Sternum more long than wide in ratio 6 : 5, truncated in front, pointed behind. Second coxae most widely apart, fourth coxae contiguous. All trochanters notched.

Colour in life: Carapace yellow with a dark longitudinal median band. Legs, palpi, maxillae, labium and sternum yellow. Abdomen yellow with a dark heart-marking.

Distribution: Japan (Honshu, Kyushu).

Family XIV. *LYCOSIDAE*

The Lycosidae are among the commonest spiders, or, at any rate, those most often seen. The genera of this family represented in Hokkaido can be identified by the following table.

1. a. Tarsus with bristles. .... 2. Gen. *Tarentula* SUNDEVALL
   b. Tarsus without bristles. .... 2.
2. a. Distal pair of ventral spines of the anterior tibiae never apical in position. .... 1. Gen. *Pirata* SUNDEVALL
   b. Distal pair of ventral spines of the anterior tibiae apical in position. .... 3. Gen. *Lycosa* LATREILLE

1. Genus *Pirata* SUNDEVALL, 1833

75. *Pirata piraticus* (OLIV.)

Pl. XV, Fig. 81. Epigynum.

Pirata piraticus, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 341.; ————:—Südrussischer Spinnen, St. Petersburg, 1875, p. 71.; E. SIMON:—Arachn. de France, Paris, Tom. 3, 1876, p. 300.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 76.; L. KOCH:—Arachn. Sibirien Novaja Semlja, Stockholm, 1879, p. 106.; W. BÖSENBERG:—Zoologica, Stuttgart, Bd. 14, 1903, p. 406, Taf. 38, Fig. 598.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 131, Taf. 26, Fig. 1482.

Lycosa piratica, J. BLACKWALL:—Spid. Gr. Brit. & Ir., 1864, p. 34.

Locality: Mt. Daisetsu (1 female, Dr. T. INUKAI, August 14, 1931). Sapporo (8 immature males, 6 females, S. SAITO, Apr. 23, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Mt. Daisetsu)	0.80	0.50	1.00	1.00	1.00	1.40
female (Sapporo)	0.90	0.50	1.10	1.10	1.10	1.50
female (Sapporo)	0.90	0.50	1.10	1.10	1.10	1.40
female (Sapporo)	0.80	0.50	0.90	0.90	0.90	1.30
female (Sapporo)	0.90	0.60	1.20	1.20	1.20	1.60
female (Sapporo)	0.80	0.50	1.10	1.10	1.10	1.50
female (Sapporo)	0.80	0.40	0.90	0.90	0.90	1.30

Female: Carapace 0.33 cm. long, 0.21 cm. wide between second and third coxae, with a longitudinal median furrow. Edge of carapace with long black and short white hairs. Anterior row of eyes slightly shorter than the median row in ratio 13 : 10. Posterior median eyes largest, anterior lateral eyes smallest and posterior lateral eyes larger than anterior median eyes. Eye-ratio 18 : 15 : 10 : 7. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by their radius. Posterior median eyes separated from each other by 1.5 times their diameter, from posterior lateral eyes by 4.5 times their diameter. Posterior lateral eyes separated from each other by six times their diameter. Clypeus equal to two times the diameter of anterior median eyes. Chelicerae normal, furnished with long black and short brown hairs. Labium rectangular, more wide than long in ratio 5 : 4. It does not reach the middle of maxillae. Maxillae wider at end than at base in ratio 4 : 3. Sternum shield-shaped, evenly rounded in front, pointed behind between fourth coxae which are contiguous.

Colour in life: Carapace blackish brown with black eye-region and

a light brown median and submarginal band. Chelicerae dull brown. Maxillae and labium light brown with white tips. Sternum black. Palpi and legs light brown, annulated with sepia. Abdomen blackish brown with a paler heart-marking and five pairs of spots at median part.

Distribution: Germany, France, England, Hungary, U.S.S.R., Siberia.

Remarks: R. CHAMBERLIN described a subspecies *Pirata piraticus* var. *utahensis* from U. S. A. (Proc. Acad. Philadelphia, 1908, p. 313).

76. *Pirata Knorrii* SCOPOLI

Pl. XV, Fig. 82. Epigynum.

Pirata Knorrii, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 343.; ———: Südrussischer Spinnen, St. Petersburg, 1875, p. 72.; C. CHYZEK et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 75.; W. BÖSENBERG:—Zoologica, Stuttgart, Bd. 14, 1903, p. 407, Taf. 39, Fig. 601.; R. BREHEN: Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 131, Fig. 1474, Taf. 25, Fig. 1483.

Pirata Knorri, E. SIMON:—Arachn. de France, Paris, Tom. 3, 1876, p. 296.

Lycosa piratoria, J. BLACKWALL:—Spid. Gr. Brit. & Ir., London, 1864, p. 36.

Locality: Sapporo (2 females, S. SAITO, Sept. 27, 1929).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.60	0.40	0.80	0.80	0.70	1.00
female	0.50	0.30	0.70	0.70	0.60	0.90

Female: Carapace 0.36 cm. long, 0.26 cm. wide between second and third coxae. Viewed from in front, anterior eyes in curved downward. Posterior lateral eyes largest and anterior eyes smallest. Eye-ratio 5 : 4 : 2. Anterior eyes equidistant, separated from each other by about their diameter. Posterior median eyes separated from each other by their diameter, from posterior lateral eyes by their radius. Posterior lateral eyes separated from each other by twice their diameter. Quadrangle of posterior eyes wider behind than in front in ratio 3 : 2, more wide than long in ratio 2 : 1. Clypeus practically wanting. Chelicerae with a brush of rather long hair on under side. Labium as long as wide, rounded anteriorly, reaching beyond middle of maxillae. Maxillae wider at end than at base in ratio 2 : 1, more long than wide in front in ratio 2 : 1. Sternum convex, shield-shaped with straight anterior margin, pointed posteriorly.

Colour in life: Carapace light brownish yellow with a marginal and submarginal and V-shaped median stripes. Caput sepia. Chelicerae, maxillae and sternum dull yellow. Labium black with dull yellow tip. Palpi and legs dull yellow, annulated with dark colour. Abdomen yellow,

furnished densely with short black hairs. Belly dull yellow.

Distribution: Germany, France, England, Hungary, U. S. S. R.

2. Genus **Tarentula** SUNDEVALL, 1833

77. ***Tarentula ishikariana*** n. sp. Jap. name, *Ishikari-Dokugumo.*

Pl. XIII, Fig. 30. Dorsal view of female.

Pl. XV, Fig. 83. Epigynum.

Locality: Ishikari (2 females, H. ITOH, Oct. 19, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	1.80	0.95	2.40	2.15	2.25	2.90
female	0.73	0.51	0.95	0.70	0.70	0.83

Female: Carapace 0.87 cm. long, 0.73 cm. wide between second and third coxae, with a longitudinal median and a definite cervical furrow. Eight eyes in three rows. Posterior eyes equal in size and largest, and anterior lateral eyes smallest. Eye-ratio 5 : 3 : 2. Viewed from above, four eyes of anterior row straight along anterior margin, the median eyes separated from each other by their radius, from anterior lateral eyes by 1/4 of their diameter. Median row of eyes shorter than the anterior in ratio 8 : 7, its eyes separated by 3/5 of their diameter. Posterior row longer than the anterior in ratio 7 : 5, its eyes separated by the length of median row. Quadrangle of posterior eyes more wide in front than long in ratio 5 : 4, and quadrangle of median eyes more wide behind than long in ratio 15 : 11. Clypeus equal to twice the diameter of anterior median eyes. Chelicerae strong, vertical, with parallel outer margins. Labium pentagonal, pointed anteriorly, as long as wide at base, reaching beyond middle of maxillae. Maxillae inclined over labium, rounded anteriorly with convergent outer margins. Sternum oval, narrowed anteriorly to the width of labium. Second coxae most widely apart, fourth coxae contiguous.

Colour in alcohol: Pars cephalica black. Pars thoracica yellowish white with a black marking along the cervical and median furrows. Chelicerae and sternum black. Maxillae and labium black with white tips. Palpi above brown, venter yellowish white. Legs above dark, bellow yellowish white. Abdomen yellowish white with a black leaf-marking. Belly dark colour.

Remarks: This species is distinguished from the other species of *Tarentula* by the great body length, by the bright colouration of body

and especially by the special form of epigynum.

78. ***Tarentula striatipes*** (L. Koch)

Tarentula striatipes, C. Chyzer et L. Kulczynski :—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 69.; W. Bösenberg :—Zoologica, Stuttgart, 1903, Bd. 14, p. 391, Taf. 36, Fig. 575.; R. Bremen :—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 133, 135, Taf. 27, Fig. 1054, Taf. 26, Fig. 1520.

Lycosa striatipes, E. Simon :—Arachn. de France, Paris, Tom. 3, 1876, p. 250.; O. Herman :—Ungarns Spinnen-Fauna, Budapest, Bd. 2, 1879, p. 266.

Locality: Mt. Daisetsu (3 males, 3 females, Dr. T. Inukai, July 16–20, 1931). Soranuma (2 immature females, S. Makino, Sept. 8, 1831).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Mt. Daisetsu)	0.85	0.46	1.18	1.18	1.15	0.85
male (Mt. Daisetsu)	0.70	0.48	1.04	0.92	0.91	1.13
male (Mt. Daisetsu)	0.92	0.48	1.38	1.23	0.99	1.35
female (Mt. Daisetsu)	1.43	0.84	1.40	1.40	1.35	1.75
female (Mt. Daisetsu)	1.33	0.84	1.50	1.50	1.40	1.82
female (Mt. Daisetsu)	0.76	0.43	0.75	0.75	0.62	0.77

Female: Carapace 0.97 cm. long, 0.32 cm. wide between second and third coxae, clothed with short, black hairs. A few long black hairs in the eye region and also in a median line behind eyes extending to median furrow which extends longitudinally. Anterior row of eyes straight, nearly equal in length to second row. Posterior median eyes largest, anterior eyes smallest and posterior lateral eyes median in size. Eye-ratio 8 : 5 : 3. Anterior median eyes separated from each other by their radius, from anterior lateral eyes by 1.5 times their diameter. Posterior median eyes separated from each other by their diameter, from posterior lateral eyes by twice their diameter. Posterior lateral eyes separated from each other by five times their diameter. Quadrangle of posterior eyes wider behind than in front in ratio 17 : 10. Clypeus almost equal to the diameter of anterior eyes. Chelicerae comparatively slender. Labium barely wider than long, emarginate at tip, articulated to maxillae 1/2 distance from base. Maxillae with nearly parallel sides, slightly inclined over labium. Sternum as long as wide, pointed behind in front of fourth coxae, sparsely clothed with long black hairs.

Colour in alcohol: Carapace and sternum blackish brown. Maxillae and labium light yellowish brown. Legs and palpi below light brown, above deep brown, annulated indistinctly with blackish brown. Abdomen brown with black spots. Belly dull brown.

Male: Carapace 0.45 cm. long, 0.31 cm. wide between second and third coxae. Submarginal band of carapace wanting. Black spots of abdomen indistinct, but heart-marking more definite than that of female.

Distribution: Germany, France, Hungary.

79. ***Tarentula flavitibia*** n. sp. Jap. name, *Kiashi-Dokugumo.*

Pl. XIII, Fig. 31. Dorsal view of female.

Pl, XV, Fig. 84. Epigynum.

Locality: Mt. Sapporodake (1 female, S. SAITO, July 13, 1930).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.70	0.45	0.70	0.70	0.70	0.95

Female: Carapace 0.32 cm. long, 0.21 cm. wide between second and third coxae. Anterior row of eyes somewhat shorter than the median row. Posterior eyes largest, anterior lateral eyes smallest. Eye-ratio 7 : 4 : 3. Anterior median eyes separated from each other by their diameter, from anterior lateral eyes by 1/4 of their diameter. Posterior median eyes separated from each other by their diameter, from posterior lateral eyes by 1.5 times their diameter. Posterior lateral eyes separated from each other by 2.5 times their diameter. Quadrangle of median eyes wider behind than in front in ratio 2 : 1. Quadrangle of posterior eyes as long as wide, wider behind than in front in ratio 3 : 2. Clypeus equal to the diameter of anterior median eyes. Chelicerae furnished with long black hairs, strong, with parallel outer margins. Labium somewhat more wide than long, articulated to maxillae at 1/2 distance from base, rounded anteriorly. Maxillae wider in front than at base in ratio 3 : 2. Sternum heart-shaped, as wide as long, pointed posteriorly. Second coxae most widely apart, fourth coxae separated by 1/2 of their width.

Colour in alcohol: Carapace blackish brown. Maxillae and labium dark with white tips. Sternum black. Coxae and femora of palpi and legs light black and other joints of legs light dull yellow and annulated with dark colour. Abdomen darker than carapace. Belly blackish yellow.

Remarks: The spider is closely allied to *Tarentula barbipes* (SUNDEVALL), but it is easily distinguished from the latter by the dull colour of abdomen and the form of epigynum.

3. Genus *Lycosa* Latreille, 1804

80. ***Lycosa daisetsuzana*** n. sp. Jap. name, *Daisetsu-Dokugumo.*

Pl. XIII, Fig. 32. Dorsal view of female.

Pl. XV, Fig. 85. Epigynum.

Locality: Mt. Daisetsu (1 male, 2 females, Dr. T. Inukai, August 4, 1930). Mt. Tokachi (1 male, 3 females, S. Saito, August 29, 1931). Soranuma (2 females, S. Makino, Sept. 8, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
male (Mt. Daisetsu)	0.60	0.35	0.97	1.00	1.00	1.20
male (Mt. Tokachi)	0.80	0.50	1.00	0.98	0.95	1.26
female (Mt. Daisetsu)	0.71	0.42	1.02	1.09	1.02	1.50
female (Mt. Daisetsu)	0.70	0.44	1.08	0.94	0.92	1.34
female (Soranuma)	0.60	0.39	1.06	1.01	0.99	1.22
female (Soranuma)	0.56	0.36	0.90	0.95	0.95	1.29
female (Mt. Tokachi)	0.65	0.40	1.10	1.10	1.02	1.50
female (Mt. Tokachi)	0.60	0.40	1.00	1.00	1.00	1.20

Female: Carapace 0.34 cm. long, 0.28 cm. wide between second and third coxae, with slanting sides and a longitudinal median furrow. Edge of carapace with long black and short white hairs. Surface of carapace with short black hairs. Anterior row of eyes slightly recurved, considerably shorter than median row in ratio 5 : 4. Anterior median eyes separated from each other by their diameter, and almost in contact with the anterior lateral eyes. Posterior median eyes separated from each other by 13/9 of their diameter, from posterior lateral eyes by the same distance. Quadrangle of posteriors wider behind than in front in ratio 4 : 3, as long as wide. Clypeus equal to the diameter of anterior lateral eyes. Chelicerae strong, with black bristles. Labium as wide as long, articulated to maxillae one third distance from base, almost parallel, with brown hairs. Sternum as long as wide, evenly rounded in front, pointed behind.

Colour in life: Carapace dark brown with a yellow stripe along the cervical and median furrows. Chelicerae brown with black fangs. Maxillae and labium yellowish brown. Sternum black. Legs and palpi dull yellow. Abdomen dull brown with white heart-marking. Belly reddish brown.

Remarks: The present species is almost identical with *Lycosa Wagneri* Hahn, but it differs chiefly in colour and the form of epigynum.

81. ***Lycosa T-insignita*** Bös. et STRAND

Lycosa T-insignita, W. BÖSENBERG u. E. STRAND:—Japanische Spinnen, Stuttgart, 1905, p. 324, Taf. 8, Fig. 109, Taf. 13, Fig. 337, 344.; S. SAITO:—Transact. Sapporo Nat. Hist., Vol. 11, 1930, p. 149.; —— :—Annot. Zool. Jap., Vol. 13, 1932, p. 385.; —— :—Transact. Sapporo Nat. Hist., Vol. 13, 1934, p. 340.

Locality: Sapporo (1 female, S. SAITO, Sept. 27, 1929). Vicinity of Sapporo (4 females, S. SAITO, Apr. 29, 1930). Mt. Daisetsu (3 females, Dr. T. UCHIDA, August 1, 1932).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female (Sapporo)	0.72	0.65	0.70	0.75	0.84	1.21
female (Sapporo)	1.30	0.90	1.40	1.40	1.30	1.85
female (Sapporo)	1.20	0.70	1.30	1.30	1.25	1.70
female (Sapporo)	1.00	0.60	1.20	1.20	1.15	1.65
female (Sapporo)	1.00	0.60	1.10	1.20	1.00	1.50
female (Mt. Daisetsu)	0.85	0.50	1.20	1.00	0.90	1.30
female (Mt. Daisetsu)	0.80	0.45	1.20	1.20	1.00	1.50
female (Mt. Daisetsu)	0.85	0.50	0.90	0.90	0.95	1.75

Female: Carapace 0.42 cm. long, 0.29 cm. wide between second and third coxae. Anterior row of eyes straight and shorter than median row in ratio 11 : 8. Anterior eyes equal in size and equidistant, separating from each other by their diameter. Posterior median eyes separated from each other by 1.5 times their diameter, from posterior lateral eyes by two times their diameter. Posterior lateral eyes separated from each other by four times their diameter. Quadrangle of posterior eyes as wide as long. Clypeus equal to the diameter of posterior median eyes. Chelicerae vertical, cone-shaped. Labium as wide as long, articulated to maxillae one third distance from base. Sternum more long than wide in ratio 6 : 5, considerably narrowed in front, pointed behind.

Colour in life: Carapace deep sepia with a median and a pair of lateral longitudinal light yellow bands. Median band begins between anterior median eyes. Lateral bands submarginal, beginning at cervical furrow and extending to posterior edge of carapace. Legs and palpi light yellow, annulated with sepia. Chelicerae black, deep brown toward fangs. Labium, maxillae and sternum black. Abdomen sepia with a light yellow heart-marking and several pairs of spots. Belly deep sepia. Spinnerets black.

Distribution: Japan (Kyushu, Honshu, Southern Saghalien).

82. *Lycosa annulata* THORELL

Pl. XV, Fig. 86. Epigynum.

Lycosa annulata, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 302.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 57.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 378, Taf. 35, Fig. 553.; S. SAITO:—Proc. Imper. Academy, Vol. 9, 1933, p. 273.

Lycosa anulata, O. HERMAN:—Ungarns Spinnen-Fauna, Budapest, Bd. 3, 1879, p. 257.

Pardosa hortensis, E. SIMON:—Arachn. de France, Paris, 1876, p. 343.

Locality: Nopporo (3 females, S. SAITO, August 17, 1933).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.70	0.35	1.00	1.00	1.00	1.40
female	0.55	0.30	0.90	0.90	0.90	1.20
female	0.60	0.30	0.90	0.90	0.90	1.30

Female: Carapace 0.31 cm. long, 0.21 cm. wide between second and third coxae. Eyes in three rows. Eyes of median and posterior rows equal in size, largest, and lateral eyes of anterior row smallest. Eye-ratio 4 : 2 : 1. Anterior median eyes separated from each other by twice their diameter, from anterior lateral eyes by their diameter. Median row of eyes longer than anterior row in ratio 6 : 5, shorter than posterior row in ratio 3 : 2. Quadrangle of median eyes wider behind than in front in ratio 2 : 1, more long than wide in front in ratio 6 : 5. Quadrangle of posterior eyes as long as wide. Chelicerae strong, vertical, with convergent outer margins. Labium triangular, more wide at base than long in ratio 5 : 3. It does not reach the middle of maxillae. Maxillae wider in front than at base in ratio 3 : 2. Sternum almost circular, narrowed anteriorly to width of labium, pointed behind. Second coxae most widely apart, fourth coxae contiguous.

Colour in life: Carapace blackish brown with dark brown submarginal spots and a stripe along the cervical furrow. Chelicerae, maxillae and labium dark brown. Sternum black. Palpi and legs dark brown, annulated with blackish brown. Abdomen dull brown.

Distribution: Germany, France, Hungary.

83. *Lycosa monticola* CLERCK

Pl. XV, Fig. 87. Epigynum.

Lycosa monticola, T. THORELL:—Rem. on Syn., Upsala, 1870–1873, p. 285.; ——— :—Südrussischer Spinnen, St. Petersburg, 1875, p. 62.; C. CHYZER et L. KULCZYNSKI:—Araneae Hungariae, Budapest, Tom. 1, 1892, p. 56.; O. HERMAN:—Ungarns Spinnen-Fauna,

Budapest, Bd. 3, 1879, p. 253.; W. BÖSENBERG:—Zoologica, Stuttgart, 1903, Bd. 14, p. 376, Taf. 35, Fig. 549.; R. BREMEN:—Tierwelt Mitteleuropas, Leipzig, Bd. 3, Lief. 2, p. 138, 141, Fig. 1570.

Pardosa monticola, L. KOCH:—Arachn. Sibirien Novaja Semlja, Stockholm, 1870, p. 102.; E. SIMON:—Arachn. de France, Paris, Tom. 3, 1876, p. 318.

Locality: Akkeshi (3 females, S. MOTODA, July 29, 1931).

Measurements:

	total length	abdomen	leg I	leg II	leg III	leg IV
female	0.65	0.35	0.80	0.80	0.80	1.20
female	0.65	0.40	0.90	0.90	0.90	1.30
female	0.50	0.40	0.80	0.80	0.80	1.30

Female: Carapace 0.31 cm. long, 0.21 cm. wide between second and third coxae, with slanting sides. Anterior row of eyes slightly shorter than median row in ratio 4 : 3, slightly curved downward. Posterior eyes largest, anterior lateral eyes smallest and anterior median eyes median in size in ratio 7 : 4 : 3. Anterior median eyes separated from each other by their radius, from anterior lateral eyes by the same distance. Posterior median eyes separated from each other by twice their diameter, and from posterior lateral eyes by the same interval. Posterior lateral eyes separated from each other by four times their diameter. Clypeus equal to the diameter of anterior lateral eyes. Chelicerae strong, with parallel outer margins. Labium triangular, more wide at base than long in ratio 3 : 2. Maxillae inclined over labium, nearly square in shape. Sternum as wide as long, narrowed anteriorly to the width of labium, rounded posteriorly. Second coxae most widely apart, fourth coxae contiguous.

Colour in alcohol: Carapace light yellow with a pair of sepia bands through the whole length. Chelicerae brownish yellow. Maxillae and labium light yellow. Sternum blackish brown. Palpi and legs below light yellow, above annulated with sepia. Abdomen light yellow with a sepia leaf-marking. Belly dull yellow with three longitudinal black stripes.

Distribution: Germany, France, Hungary, U. S. S. R., Siberia.

EXPLANATION OF PLATES

Plate XII

1. *Oecobius sapporense* n. sp.; a, b, ♀.
2. *Oxytate setosa* KARSCH; a, Subadult ♂. b, ♀.
3. *Thomisus albus* GMELIN; ♀.
4. *Pistius truncatus* (PALL.); ♀.
5. *Synaema globosa japonica* KARSCH; ♀.
6. *Tmarus piger* WALCKENAER; a, ♀. b, Sideview of abdomen.
7. *Oxyptila nigrifrons* n. sp.; ♂.
8. *Xysticus sapporensis* n. sp.; ♀.
9. *Philodromus flavidus* n. sp.; ♀.
10. *Clubiona glatiosa* n. sp.; ♂.
11. *Castianeira albimaculata* n. sp.; ♀.
12. *AElurillus subfestivus* n. sp; ♀.
13. *Icius daisetsuzanus* n. sp.; ♀.
14. *Teutana albimaculosa* n. sp.; ♂.
15. *Argyrodes yesoensis* n. sp.; a, Black ♀. b, White ♀. c, Sideview of black specimen.

Plate XIII

16. *Argyrodes sinicolum* n. sp.; ♀.
17. *Linyphia exornata* L. KOCH; ♀.
18. *Oedothorax trilineatus* n. sp.; ♀.
19. *Nesticus cericeus* n. sp.; ♀.
20. *Argiope aurea* n. sp.; ♀.
21. *Cyclosa atrata* BÖS et STRAND; a, b, ♀.
22. *Araneus tokachianus* n. sp.; ♀.
23. *Araneus triguttatus* FABRICIUS; a, b, ♀.
24. *Araneus mnoeda* THORELL; ♀.
25. *Tetragnatha yesoensis* n. sp.; a, b, ♂.
26. *Tetragnatha exquisita* SAITO; ♂.
27. *Coras luctuosus* (L. KOCH); ♀.
28. *Cicurina maculifer* n. sp.; ♀.
29. *Cryphoeca angularis* n. sp.; ♀.
30. *Tarentula ishikariana* n. sp.; ♀.
31. *Tarentula flavithia* n. sp.; ♀.
32. *Lycosa daisetsuzana* n. sp.; ♀.

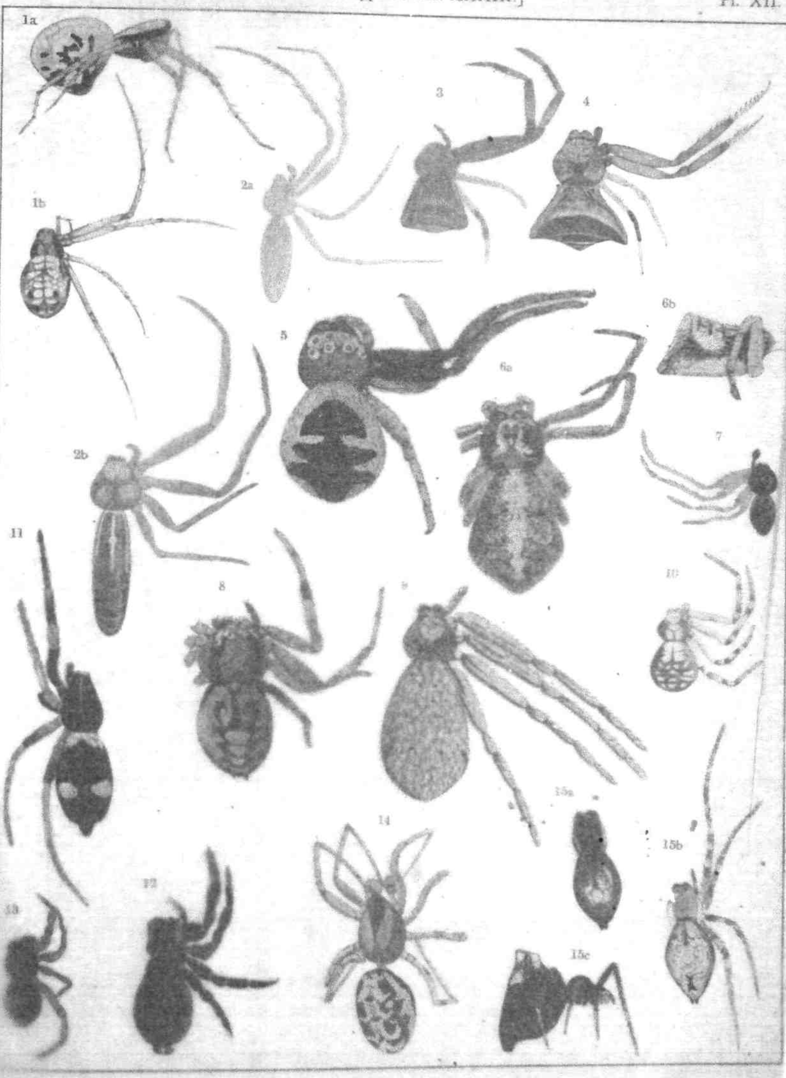
Plate XIV

33. *Oecobius sapporense* n. sp.; a, Eyegroup. b, Epigynum.
34. *Oxytate setosa* KARSCH; Eyegroup (♀).
35. *Thomisus albus* GMELIN; Eyegroup (♀).
36. *Pistius truncatus* (PALL.); a, Eyegroup. b, Epigynum.
37. *Misumena tricuspidata* (FABRICIUS); a, Eyegroup (♀). b, Epigynum. c, d, Palpus (♂).
38. *Synaema globosa japonica* KARSCH; Tarsal claw.
39. *Tmarus piger* WALCKENAER; Eyegroup.
40. *Oxyptila nigrifrons* n. sp.; a, Eyegroup. b, c, Palpus (♂).
41. *Xysticus sapporensis* n. sp.; Frontview of eyegroup.
42. *Xysticus tunicatus* BÖS. et STRAND; Epigynum.
43. *Philodromus flavidus* n. sp.; a, Eyegroup. b, Chelicerae. c, Epigynum.
44. *Tibellus oblongus* WALCKENAER; Eyegroup.
45. *Clubiona mantis* BÖS. et STRAND; a, Carapace (♂). b, c, Palpus (♂).
46. *Clubiona lutescens* WESTRING; a, b, Palpus (♂).
47. *Clubiona [illegible]* n. sp.; Eyegroup.
48. *Chiracanthium lascivum* KARSCH; a, Carapace (♀). b, palpus (♂).
49. *Castianeira albimaculata* n. sp.; a, Epigynum. b, Eyegroup.
50. *AElurillus [illegible]* n. sp.; a, Epigynum. b, Carapace from above.
51. *[illegible]* n. sp.; a, Eyegroup. b, Epigynum.
52. *Theridion subpallens* BÖS. et STRAND; a, Epigynum from above. b, Sideview of epigynum. c, Eyegroup.
53. *Teutana albimaculosa* n. sp.; Carapace.
54. *Argyrodes [illegible]* n. sp.; Eyegroup.
55. *Argyrodes [illegible]* n. sp.; a, Epigynum. b, Sideview of carapace.

Plale XV

56. *Linyphia emphana* WALCKENAER; a, Epigynum from a little beneath. b, Epigynum from above.
57. *Linyphia pusilla* SUNDEVALL; a, Epigynum from above. b, Sideview of epigynum.
58. *Linyphia marginata* C. L. KOCH; a, Epigynum from above. b, Epigynum from a little beneath.
59. *Linyphia peltata* WIDER-REUSS.; a, Epigynum from above. b, Sideview of epigynum. c, Palpus (♂).
60. *Linyphia [illegible]* L. KOCH; a, Epigynum from above. b, Epigynum from a little beneath.
61. *Oedothorax [illegible]* n. sp.; a, Eyegroup. b, Epigynum.
62. *Nesticus [illegible]* n. sp.; a, Eyegroup. b, Epigynum.
63. *Argiope aurea* n. sp.; a, Epigynum from above. b, Sideview of epigynum.

64. *Araneus quadratus* CLERCK; a, Sideview of epigynum. b, Epigynum from above. c, Eyegroup.
65. *Araneus tokachianus* n. sp.; Epigynum from above.
66. *Araneus triguttatus* CLERCK; Epigynum from above.
67. *Araneus angulatus* CLERCK; Epigynum from above.
68. *Araneus ventricosus* L. KOCH; a, Sideview of epigynum. b, Epigynum from above.
69. *Tetragnatha squamata* KARSCH; a, b, Chelicerae (♂). c, Palpus (♂). d, Eyegroup.
70. *Tetragnatha yesoensis* n. sp.; a, Palpus (♂). b, c, Chelicerae (♂).
71. *Tetragnatha exquista* SAITO; Palpus (♂).
72. *Amaurobius claustrarius* (HAHN); a, b, Palpus (♂).
73. *Coras luctuosus* (L. KOCH); Epigynum.
74. *Agelena japonica* KARSCH; a, Eyegroup. b, Epigynum.
75. *Agelena opulenta* L. KOCH; Epigynum.
76. *Cicurina cinerea* PANZER; Eyegroup.
77. *Cicurina maculipes* n. sp.; Eyegroup.
78. *Cryphoeca angularis* n. sp.; a, Eyegroup. b, Sternum.
79. *Dolomedes saganus* BÖS. et STRAND; Eyegroup.
80. *Dolomedes sulfureus* L. KOCH; Eyegroup.
81. *Pirata piraticus* (OLIV.); Epigynum.
82. *Pirata Knorrii* SCOPOLI; Epigynum.
84. *Tarentula flavitibia* n. sp.; Epigynum.
85. *Lycosa daisetsuzana* n. sp.; Epigynum.
86. *Lycosa annulata* THORELL; Epigynum.
87. *Lycosa monticola* CLERCK; Epigynum.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64. *Araneus quadratus* CLERCK, a, Sideview of epigynum. b, Epigynum from above. c, Eyegroup.

65. *Araneus tokachianus* n. sp.; Epigynum from above.

66. *Araneus triguttatus* CLERCK; Epigynum from above.

67. *Araneus angulatus* CLERCK; Epigynum from above.

68. *Araneus ventricosus* L. KOCH; a, Sideview of epigynum. b, Epigynum from above.

69. *Tetragnatha squamata* KARSCH; a, b, Cheliceræ (♂). c, Palpus (♂). d, Eyegroup.

70. *Tetragnatha yesoensis* n. sp.; a, Palpus (♂). b, c, Cheliceræ (♂).

71. *Tetragnatha exquisita* SAITO; Palpus (♂).

72. *Amaurobius claustrarius* (HAHN); a, b, Palpus (♂).

73. *Coras luctuosus* (L. KOCH); Epigynum.

74. *Agelena japonica* KARSCH; a, Eyegroup. b, Epigynum.

75. *Agelena opulenta* L. KOCH; Epigynum.

76. *Cicurina cinerea* PANZER; Eyegroup.

77. *Cicurina maculipes* n. sp.; Eyegroup.

78. *Cryphoeca angularis* n. sp.; a, Eyegroup. b,

79. *Dolomedes saganus* BÖS. et STRAND; Eyegroup.

80. *Dolomedes sulfureus* L. KOCH; Eyegroup.

81. *Pirata piraticus* (OLIV.); Epigynum.

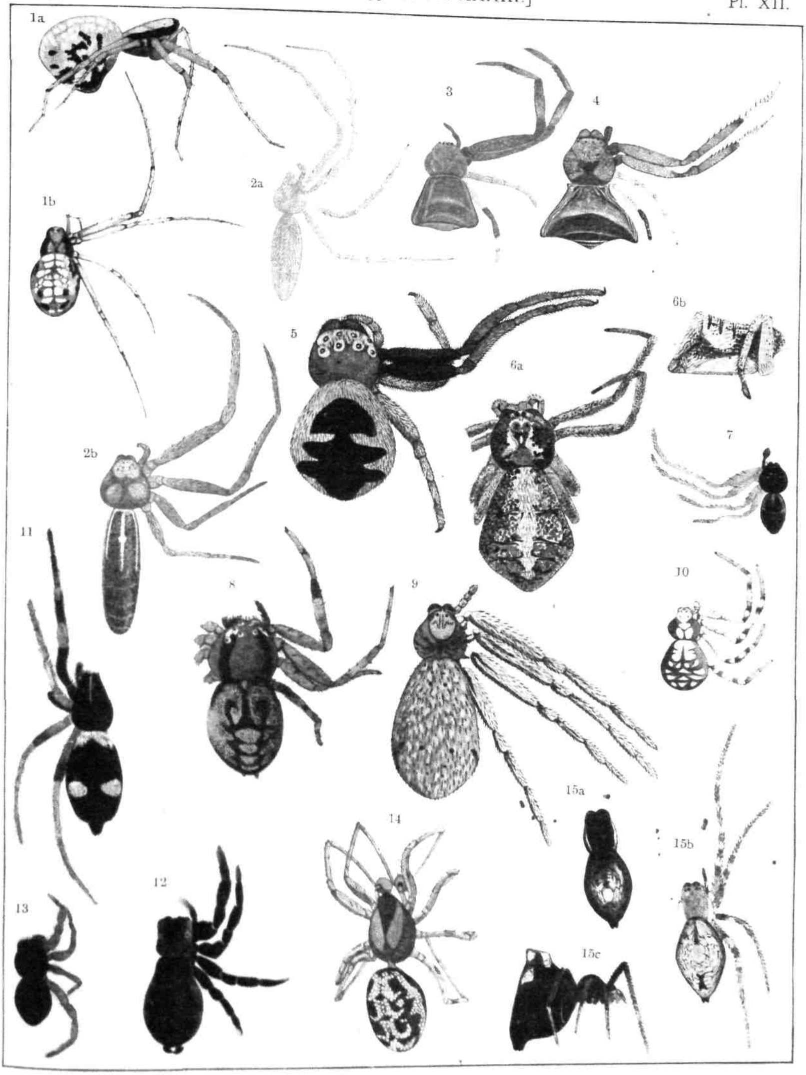
82. *Pirata Knorri* SCOPOLI; Epigynum.

83. *Tarentula flexibilis* n. sp.; Epigynum.

84. *Lycosa daisetsuzana* n. sp.; Epigynum.

85. *Lycosa annulata* THORELL; Epigynum.

86. *Lycosa monticola* CLERCK; Epigynum.



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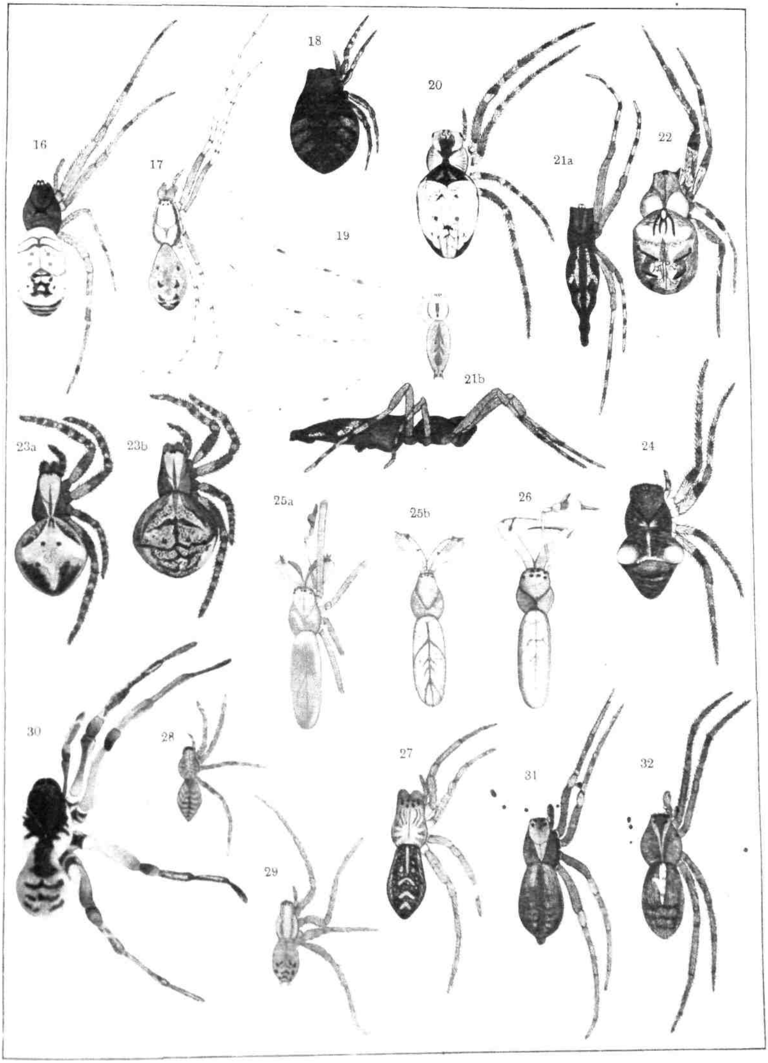

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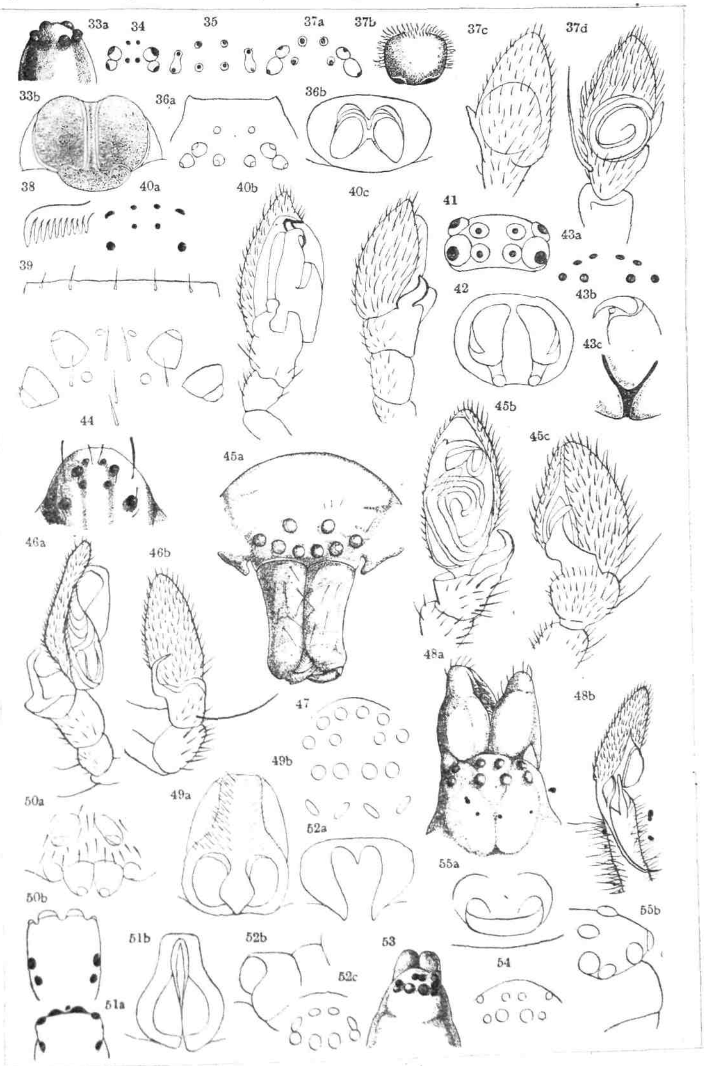
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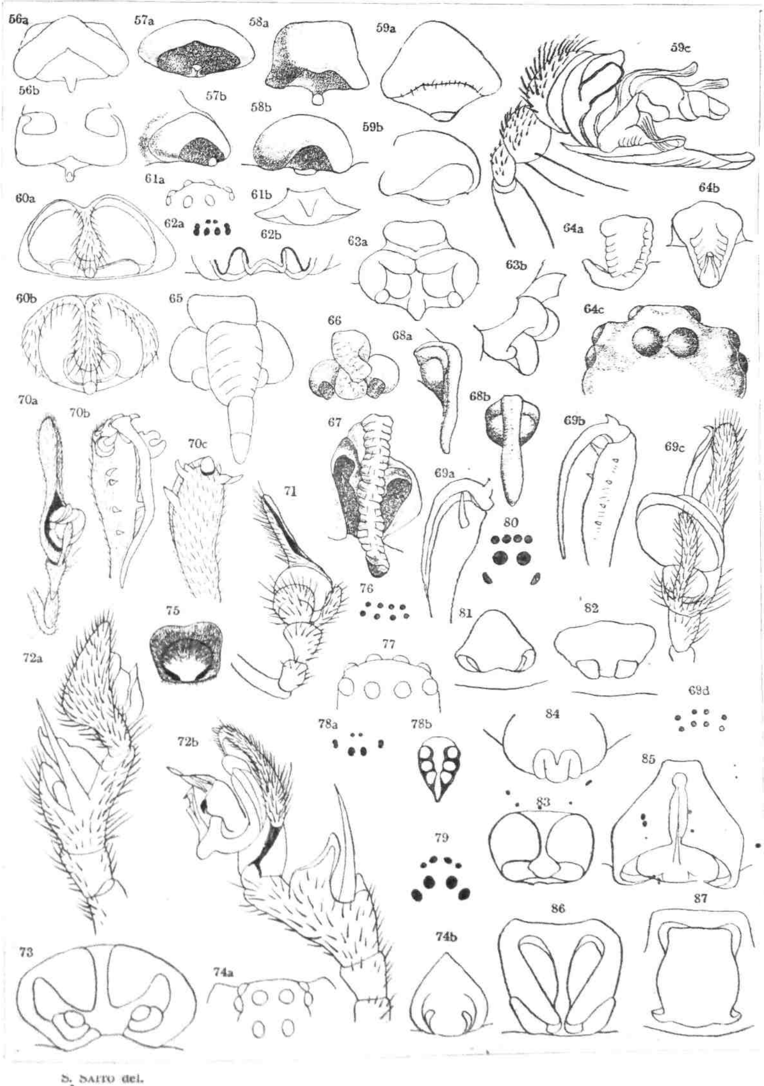
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